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P R A C T I C E

OF

PHYSIC, SURGERY, AND MIDWIFERY.

THE
EDINBURGH PRACTICE
OF
PHYSIC, SURGERY,
AND
MIDWIFERY;

PRECEDED BY
AN ABSTRACT OF THE THEORY OF MEDICINE,
AND
THE NOSOLOGY OF DR. CULLEN:

AND INCLUDING
UPWARDS OF SIX HUNDRED AUTHENTIC FORMULÆ,
FROM THE BOOKS OF ST. BARTHOLOMEW'S, ST. GEORGE'S,
ST. THOMAS'S, GUY'S, AND OTHER HOSPITALS IN
LONDON, AND FROM THE LECTURES AND
WRITINGS OF THE MOST EMINENT
PUBLIC TEACHERS.

With Twenty Quarto Plates.

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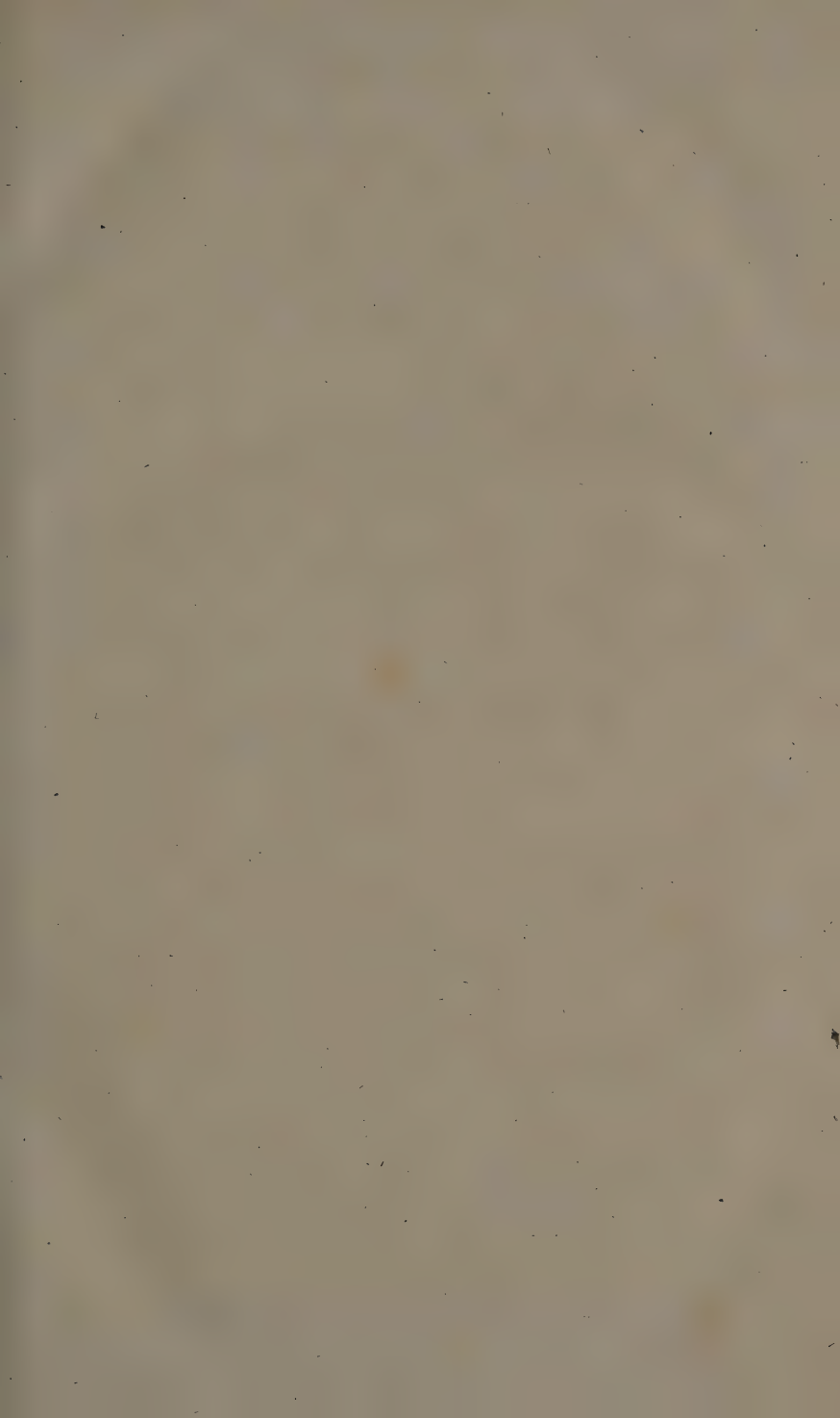
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SURGERY.

CHAP. VII. OF INDOLENT TUMORS.

THESE are such as are slow in their progress, and may continue for a long time without being attended with either pain or inflammation; though occasionally almost all of them may be inflamed, and some of them, in that state, attended with considerable pain. They are of different kinds according to the nature of their contents, and appear in various parts of the body. They are seated in the adipose and cellular membrane; whence it often happens that they take place in the viscera themselves, where they are frequently mortal. Sometimes they are filled with a substance of the consistence of honey, and are thence called *meliceratous* tumors; sometimes they are filled with a harder substance, and are then called *atheromatous* tumors; at other times they are filled with a substance of the consistence of fat, and are then called *steatomatous*. Sometimes, however, they are found to be replenished with a fluid lymph coagulable by heat, and are then called *hydatids*. One kind are filled with matter like the synovia of the joints, and have the name of *ganglions*. A short account of these tumors will suffice.

Meliceris.—This is an encysted tumor, containing a half transparent fluid, resembling honey in colour and consistence; the contents of the *atheroma* are like a bread and milk poultice; and those of the *steatoma* resemble suet. From the difference in these fluids, and in their consistence, it is evident that the feel of them will be very different; and that although a degree of fluctuation may be felt in each of them, yet this will be more obscure in the *atheroma* than in the *meliceris*, and still more in the *steatoma*. Whenever we see, however, any tumor, formed in any of the superficial parts of the body, increasing gradually almost without pain, entirely without discolouration, or any other symptom indicating suppuration, and in which we feel a fluctuation, we may conclude it to be a swelling of one of these kinds.

They are perfectly devoid of danger, and generally very small in their first appearance; so that although there be, in general, little hope of succeeding in our attempt to cure them by resolution, yet the attempt may be made properly and with safety. The best application for this purpose, is either crude sal ammoniacum dissolved in an aqueous or spirituous menstruum, and applied to the part; or the volatile spirit so far diluted as to prevent it from fretting the skin.

These applications may likewise be assisted by pressure, where the tumor is in any part that will admit of it, and we have known these means to succeed in some few instances, in an early state of the disease. We may now and then cure the little encysted tumor that happens frequently in the skin of the eye-lids, and which we have always found to be a steatoma, by the application of mercurial ointment.

We may therefore, unless they should acquire such a volume as to prove troublesome, wait with safety to observe what turn these tumors will take, although they will not yield to resolute means; for the cysts will sometimes fall into suppuration, particularly that of the meliceris, and will come away by a simple opening of the skin.

Ranula.—This contains much the same kind of fluid as the ganglion. It is called by the French *grenouillette*, or rather "*grenouille*," as appears by the *Manuel Lexique des mots François dont la signification n'est pas familière à tout le monde*. "En termes de médecine, on nomme *grenouille* une petite humeur froide et visqueuse, qui, tombant du cerveau, se ramasse sous la langue, dont elle rend l'usage difficile."

It is a little transparent tumor seated under the tongue, by the side of the ranular artery; of greater or less size, yet sometimes of such magnitude, as to impede the motions of the tongue, and obstruct the patient's speech. Although this cyst be divided throughout its whole length, in order to let out the fluid, the disease will be very likely to return, unless some care be taken to prevent it. One of the modes recommended for this purpose, and which is often effectual, is to mix a quantity of mel rosæ, with as much diluted acid of vitriol as will make it very sour, to dip a probe in this liquid, and to rub the cyst with it. Mr. Justamond once succeeded in curing this little disease by a different contrivance. As the patient would not suffer him to put a lancet into it, he directed her to make a strong solution of alum, and dipping a piece of lint fastened to the end of a skewer, to rub the tumor smartly every day, as long as she could bear it. By following these directions, she got rid of the ranula in a few days, though she had been troubled with it a long time; and latterly, it had grown exceedingly alarming and inconvenient to her.

Wiseman treats on this disease very fully. He says, "It is a soft tumor without pain or alteration of colour in the skin. It yieldeth to the impression of your fingers, but riseth upon the taking them off, and containeth a matter not unlike the white of an egg, or such as we meet with in *atheroma*. It is also discovered by a croaking in the speech." He says the cure is difficult, that the treatment should be similar to that of *strumæ*; but if topics prove ineffectual, then recourse must be had to the *actual cautery*.

Tumors of this kind are easily distinguished from all others, as having neither heat, pain, nor pulsation, as is to be observed in those which incline to suppurate; and they are distinguished from each

other, before they are laid open, by fluctuation being readily perceived in the meliceris : the atheroma is soft and compressible, but has no fluctuation ; while the steatoma is commonly firm, and rolls under the skin. But these rules are liable to considerable exceptions. The meliceris and atheroma are most commonly found upon the head, and the steatoma upon the other parts of the body ; while ganglions are situated over the tendons of the muscles. These tumors must be either extirpated entirely, or laid open so as to dispose the cyst to slough off or granulate. If the matter be fluid, we may evacuate it by an opening made with a lancet, or by means of a seton ; but as the matter is apt to collect again, it is better to remove the sac entirely. If large vessels or nerves prevent this from being done, then it is to be laid freely open and exposed to the air, so that the bag may granulate, or be thrown off. When the tumor is to be extirpated, a longitudinal incision is to be made through the integuments ; after which the tumor may be frequently removed by the point of the finger, or by the end of a spatula, replacing the integuments with a view to heal by the first intention. In every pendulous tumor of this kind, with a narrow neck, we ought to divide the teguments near the bottom of the tumor, in an oval form, so that the wound may be afterwards properly covered with the remaining integuments. After the tumor is removed, the skin is to be replaced over the wound, and fixed with adhesive straps, covering it with a pledget of cerate, and small compress of linen, with a bandage above all, to make a gentle pressure on the parts.

SECT. I. *Of STEATOMATOUS and SARCOMATOUS TUMORS.*

Steatomatous tumors have been ranked by authors among those of the encysted kind ; but they have no other cyst containing them than the common cellular substance, somewhat condensed ; and the particles of fat composing them are found of the same size with those in a sound part of the body.

Authors formerly advised the discussion of steatoma, or the prevention of their growth, by the application of pressure ; but by such means the growth is rather promoted than retarded, nor have internal remedies been of any advantage. They must be removed therefore by an operation which is the same with that for the extirpation of encysted tumors.

Sarcomatous tumors have nearly the same external appearance with those of the steatomatous kind. The term has been applied, in a general way, to scirrhi of the glands ; but sarcomatous tumors are likewise found in various other parts of the body, and are distinguished from steatoma by being firmer to the touch ; internally they are found of a redder colour, or approaching that of muscles, in consequence of the greater number of vessels entering into their

substance. These are to be treated in the same manner as *featoms*; but the operation ought to be performed early, as they are more apt to degenerate into cancer.

SECT. II. Of GANGLIONS, or Swellings of the *Bursæ Mucosæ*.

Ganglions of the tendons are likewise tumors of the encysted kind, seated in the *bursæ mucosæ*, or sheaths of the tendons which belong to the extremities. They are most frequently met with over the tendons upon the back of the wrist, and often likewise about those of the ankle and other parts of the extremities. When pressed, they are found to possess a considerable degree of elasticity, from which, and from their situation, they may generally be distinguished from other encysted tumors. They seldom arrive at any great bulk, are not often attended with pain, and commonly the skin retains its natural appearance. On being laid open, they are found to contain a tough, viscid, transparent fluid, resembling the white of an egg.

They are generally produced by sprains, or contusions of the joints, or by rheumatism. In many instances, they go off insensibly, without any assistance from art; but as this is often not the case, means ought to be used for removing them. For this purpose, moderate friction frequently repeated, or gentle compression applied to them by means of thin plates of lead, &c. sometimes remove them. In some instances they have been removed by the application of blisters; but the most certain method is, to make a small puncture into the sac, and to draw a cord through it; or, after the puncture is made, to press out the contents, and then inject some gently stimulating fluid, as port wine and water heated blood-warm. Sometimes, in tumors of this kind, bodies of a cartilaginous nature, and of different shapes and sizes, are found; some quite smooth, others with peduncles; by which they are supposed by Dr. Monro, in his work upon *bursæ mucosæ*, to have been attached to the *bursæ*. As these cannot be removed by any remedy with which we are yet acquainted, it is found necessary to discharge them. But as the parts may sometimes suffer from inflammation when the tumor is laid fully open, it may be punctured at each end; and, after pressing out the contents, a small cord may be introduced; after which gentle pressure may be applied with a compress and bandage over the course of the tumor. The cord however should not be continued so long as to induce any great degree of inflammation, for it is found that a slight degree of this sufficiently answers the purpose.

SECT. III. Of COLLECTIONS within the CAPSULAR LIGAMENTS, of JOINTS, and of Cartilaginous Bodies contained there.

Collections here may consist of serum, blood, or pus and synovia combined. They are most frequently met with in the joint of the

knee, and may be produced either by internal or external causes. These kinds of collections may in general be distinguished from each other.

Watery effusions, commonly called *dropical swellings* of the joints, arise chiefly in consequence of severe rheumatic complaints; and when the tumor is not very large, the fluctuation of the fluid may be felt on pressure. When a large effusion appears immediately after a violent bruise, it is probable that it consists chiefly of blood: but when it succeeds a violent sprain, attended with great pain, inflammation, and swelling, terminating in an effusion, there is every reason to think that the contained fluid consists of pus mixed with synovia.

Swellings of the joints are most apt to be confounded with collections in the bursæ mucosæ, or with matter effused in the adjacent cellular substance. From the first of these they are generally distinguished by the contained fluid passing readily from one side of the joint to the other, and from its being diffused over the whole of it; whereas, when it is contained in the bursæ, the tumor is confined to a particular part, and is seldom attended with much pain.

When such collections can safely be allowed to remain, the capsular ligament ought never to be opened, as they can often be removed by discutients. Even considerable collections arising from rheumatism may commonly be dissipated by friction, fomenting the parts with warm vapour, keeping them constantly moist with saturnine solutions, covering them properly with flannel, and applying blisters. When these fail, supporting the part with a laced stocking, or with a roller, has frequently been of service. But whether a rheumatic tumor can be dissipated or not, it ought not to be opened; for the inconvenience attending it is more intolerable than the pain and inflammation which may ensue. But when the matter would do mischief by lodging, it should be discharged. Effused blood and matter which succeed high degrees of inflammation are of this kind. Blood is frequently extravasated among soft parts without much detriment; but when in contact with cartilage or bone, it soon hurts them materially. The matter *ought to be discharged* so as most effectually to prevent the admission of air into the cavity of the joint. For this purpose the opening should be made with a trocar; and the skin, previously drawn tight to the upper part of the tumor, should be pulled down immediately on withdrawing the canula. A piece of adhesive plaster should be directly laid over the opening, and the whole joint should be firmly supported by a flannel roller properly applied. If the patient be plethoric, he should be bled to such an extent as his strength will bear; he should be put upon a strict antiphlogistic regimen, and in every respect should be managed with caution; for inflammation being very apt to ensue, we cannot too much guard against it.

Joints are sometimes rendered painful and stiff by the formation of different *substances within the capsular ligaments*. These are sometimes loose, and as firm as cartilage; and sometimes of a soft membranous nature, similar to those already observed in treating of swellings of the bursa mucosa.

In some cases these substances, especially the last species, retain nearly the same situation, without being much affected either by pressure or by the motion of the joint: in that case the pain is constant, but seldom severe. The first species, however, is commonly very moveable; and on being touched, they slip with such facility that it is difficult to fix them even with the fingers. These are only painful in particular situations.

Where these concretions appear, upon examination, to be perfectly loose and detached, if the pain which they excite is very severe, we should venture in a cautious manner to take them out, by making an incision into the joint. But if there is reason to suspect that they are connected with any part of the joint, the patient ought to be advised to submit to the pain they induce, which in general will be rendered moderate by shunning exercise; but if, notwithstanding this, it becomes insupportable, amputation is the only resource.

The limb being firmly secured by assistants, in that posture which admits of the body to be taken out being felt most distinctly, the surgeon should endeavour to fix it with his fingers towards the upper part of the joint, after an assistant has drawn the skin as much as possible upwards from the part where the incision is to be made. The operator with a scalpel is now to make an incision through the teguments and capsular ligament, directly upon the substance itself, of such a size as will admit of its being easily taken out; which may be done either with the finger or with the end of a blunt probe. If it is found to be connected by any small filaments either to the capsular ligament or to the cartilages of the joint, they should be cautiously divided, either with a probe-pointed bistoury, or probe-pointed scissors, after drawing the substance itself as far out as it can be got. When more concretions than one are found, they should all be taken out at the same opening, when this can be done; but when it cannot, it will be better to allow the first incision to heal before attempting the second, so as to avoid as much as possible the exciting of inflammation.

After the concretion is removed, the skin should be immediately drawn over the wound in the capsular ligament; and the lips of the opening in the skin being laid together, they need be secured in this situation by pieces of adhesive plaster, so as to prevent the air from finding access to the cavity of the joint. Till the wound be completely healed, the patient need not be confined to bed, but the limb should be kept as much as possible in one posture, and a strict antiphlogistic regimen should be observed.

To this section we shall annex some excellent observations on the loose cartilages found in joints, and most commonly met with in that of the knee, published by Mr. HOME, in the transactions of a society in London established for the improvement of medicine and surgery.

"Such detached and moveable cartilages," says Mr. Home, "as are the subject of the following observations, are not peculiar to the joint of the knee; they occasionally occur in other joints of the body; but as they are most frequently met with in the knee, and it is in that joint they produce symptoms which render them the object of a surgical operation, I shall consider them more particularly when situated in that cavity.

"These substances, in their structure, are analogous to bone, but in their external appearance bear a greater resemblance to cartilage; they are not, however, always exactly of the same structure, being in some instances softer than in others. Their external surface is smooth and polished, which, being lubricated by the synovia, allows them to be moved readily from one part of the joint to another, seldom remaining long at rest, while the limb is in motion; when they happen to be in such situations as to be pressed upon with force by the different parts of the joint, they occasion considerable pain, and materially interfere with its necessary motions.

"The circumstance of their being loose, and having no remains of a visible attachment, made it difficult to form conjectures respecting their formation; and I believe that no satisfactory account of their origin had been given, till Mr. Hunter's observations threw light upon the subject. The circumstances which led him to the investigation of this subject, appear at first sight so foreign to the purpose, that they require some explanation.

"In the course of his experiments and observations, instituted with a view to establish a living principle in the blood, Mr. Hunter was naturally induced to attend to the phenomena which took place when that fluid was extravasated, whether in consequence of accidental violence, or other circumstances. The first change which took place he found to be coagulation; and the coagulum thus formed, if in contact with living parts, did not produce an irritation similar to extraneous matter, nor was it absorbed and taken back into the constitution, but, in many instances, preserved its living principle, and became vascular, receiving branches from the neighbouring blood-vessels for its support; it afterwards underwent changes, rendering it similar to the parts to which it was attached, and which supplied it with nourishment.

"In attending to cases of this kind, he found that where a coagulum adhered to a surface, which varied its position, adapting it to the motions of some other part; the attachment was necessarily diminished by the friction, rendering it in some instances pendulous, and in others breaking it off entirely. To illustrate this by exam-

ple, I shall mention an instance which occurred in the examination of a dead body. The cavity of the abdomen was opened, to examine the state of its contents, and there appeared lying upon the peritoneum a small portion of red blood, recently coagulated; this, upon examination, was found connected to the surface upon which it had been deposited, by an attachment half an inch long, and this neck had been formed before the coagulum had lost its red colour. This steeped in water, so as to become white, appeared like a pendulous tumor.

"From this case it became easy to explain the mode in which those pendulous bodies are formed, that sometimes occur attached to the inside of circumscribed cavities; and the principle being established, it became equally easy for Mr. Hunter to apply it under other circumstances, since it is evident from a known law in the animal economy, that extravasated blood, when rendered an organised part of the body, can assume the nature of the parts into which it is effused, and consequently the same coagulum which in the abdomen formed a soft tumor, when situated on a bone, or in the neighbourhood of bone forms more commonly a hard one. The cartilages found in the knee joint, therefore appeared to him to originate from a deposit of coagulated blood upon the end of one of the bones, which had acquired the nature of cartilage, and had afterwards been separated. This opinion was further confirmed by the examination of joints which had been violently strained, or otherways injured, where the patients had died at different periods after the accident. In some of these there were small projecting parts, preternaturally formed, as hard as cartilage, and so situated as to be readily knocked off by any sudden or violent motion of the joint.

"This opinion Mr. Hunter mentioned for many years in his lectures, and his arguments in favour of it are so consonant to the general laws by which the operations of an animal machine are regulated, as scarcely to require further evidence; but the following case exhibits so many facts in confirmation of his theory, that it appears to me to afford a full explanation of the process above mentioned, and completely to establish the opinion.

"A man, sixty-eight years of age, was brought into St. George's hospital, on the 20th of March, 1791, with a simple fracture of the right thigh bone. The fracture was situated about three inches below the great trochanter; it was treated in the usual manner, but no bony union had taken place in the beginning of June, about eleven weeks after the accident, the portions of bone at that time being readily moved on each other. There being nothing in the man's general health to account for this backwardness in the parts to unite, he was desired to explain whatever circumstance he was acquainted with respecting himself, likely to throw any light upon it. This enquiry led the patient to mention, that his right os hu-

meri had been broken three years and nine months before, but that the bones had continued disunited, and admitted of motion more freely at that time, than immediately after the accident.

"Rest having proved ineffectual in producing union in the thigh, and it being evident, from the circumstance of the arm, that there was a natural backwardness in the constitution to form bony union, he was directed to walk upon crutches, and to press as much upon the broken thigh as the state of the parts would admit, without considerable pain, with a view to rouse the parts to action, forcing them by a species of necessity to strengthen the limb. In the course of a fortnight there was an evident firmness in the bone, and in less than two months the patient could walk with the assistance of a stick. As there was something uncommon in the case, he was allowed to remain in the hospital to acquire strength; in this convalescent state he was seized with a complaint in his bowels, which was very violent, and carried him off."

Mr. Home describes the following appearances on dissection:

"After death the thigh-bone was found firmly repaired by bony union, but the bone of the arm, an account of which is more immediately to the present subject, admitted of motion in every direction at the fractured part.

"The arm was carefully dissected, to examine the state of the fractured parts, between which there was no callus, but a large bag filled with a glairy fluid, resembling synovia. The internal surface of this bag was smooth, like a capsular ligament, and its attachment to the bones was of the same kind: it adhered firmly to the surrounding parts, which were thickened and consolidated, rendering it very strong. The two ends of the bone were adapted to each other, all the irregularities having been absorbed, and their surfaces were of considerable extent, from the fracture being oblique; the upper one was slightly concave, or rather had two depressions, with a middle ridge; the lower one was smaller and rounded, and was adapted to both concavities, which received it in the different motions of the parts.

"The surfaces of the bones fitted for motion were not completely covered with cartilage, but studded over with it, and the bone was exposed in the interstices; a number of projecting parts, covered with cartilage, grew out from the surfaces, some exceedingly small, others large. From the edges of the bones and the capsular ligaments, these excrescences were larger, extremely irregular in their shape, broader in their attachments, softer in their texture, and serrated upon the external edge.

"*Thirty or forty small substances*, similar to those above mentioned, were found loose in the cavity, varying in size from that of millet-seed to that of a barley corn, of a roundish form, and smooth on the surface; the largest of them were more flattened, and serrated. Their hardness varied considerably, some of them being as soft as

cartilage, others so solid as not to be pierced by a needle. Those bodies must have been originally attached, and broken off by the friction of the parts on one another.

“The preternatural cavity which I have described, was in its nature and use similar to the naturally formed joints of the body; these excrescences and loose bodies were its principal peculiarities, the formation of which appears to have been the result of the violence committed on the parts previously to the formation of the joint, and may be explained in the following manner.

“When the bone was broken, the ruptured vessels poured out their contents into the interstices of the lacerated parts, for the purpose of uniting them again; this, however, not taking place, it was necessary to accommodate the parts to their disunited state: to this end the blood, which had now become useless, was in part absorbed, and the new joint formed. The remains of the coagulated blood, which had not given the stimulus for its own absorption, underwent changes in its nature, assimilating it as much as possible to that of the surfaces to which it was attached, in some parts its texture resembling ligament, in others being more allied to cartilage, or bone.

“When we compare these substances with the loose cartilages found in the knee-joint, which are also produced in consequence of accidental violence, and similar in their appearance, we are naturally led to conclude that the latter originate from extravasations of blood, altered in its nature by the parts in which it is deposited, similar to those in the artificial joint above described. In both cases they are evidently new-formed substances, and the readiest mode by which we can account for their production, is to refer them thus to the blood, from which fluid every part of the body was originally formed.

“These loose cartilages, as they have been commonly called, although they may occur in any joint of the body, are found most frequently in the knee; and in this joint, from the pain and inconveniences they produce, have become the object of an operation in surgery.

“One or more of them may be formed in the same joint; I have known one instance in which there were three; they are commonly about the size of a horse-bean, often much smaller, and sometimes considerably larger: when very large, they do not give so much trouble to the patient as the smaller kind. A soldier in the 56th regiment has one nearly as big as the patella, which occasions little uneasiness, being too large to insinuate itself into the moving parts of the joint.

“In this disease, the removal of the loose bodies is the only mode of relief; and it is fortunate for those who are afflicted with it, that the knee joint is the most favourable in the body for such an operation; for the cavity extends a considerable way beyond the moving parts of the joint, and is continued into parts, which, when divided,

will more readily unite than the common capsular ligaments, and be less liable to communicate the inflammation that comes upon the wound to the general cavity.

“As these loose bodies cannot always be found, no time can be fixed for the operation; but the patient, who will soon become familiar with his own complaint, must arrest them when in a favourable situation, and retain them there till the surgeon can be sent for.

“Before the operation, the limb should be extended upon a table in an horizontal position, and secured by means of assistants; the loose cartilages are to be pushed into the upper part of the joint above the patella, and then to one side, the inner side is to be preferred, as in that situation only the vastus internus muscle will be divided in the operation. Should there be several of these bodies, they must be all secured, or the operation should be postponed till some more favourable opportunity, since the leaving of one will subject the patient to the repetition of an operation, not only painful, but attended with some degree of danger.

“The loose bodies are to be secured in the situation above mentioned by an assistant, a task not easily performed, while they are cut upon, from their being lubricated by the synovia; and if allowed to escape into the general cavity, they may not readily, if at all, be brought back into the same situation.”

It is of importance to attend to Mr. Home's instructions respecting the operation. He says,

“The operation consists in making an incision upon the loose cartilage, which it will be best to do in the direction of the thigh, as the wound will more readily be healed by the first intention. If the skin is drawn to one side, previously to making the incision, the wound through the parts underneath will not correspond with that made in the skin, which circumstance will favour their union. The incision upon the cartilage must be made with caution, as it will with difficulty be retained in its situation if much force is applied. The assistant is to endeavour to push the loose body through the opening, which must be made sufficiently large for that purpose; but as this cannot always be done, the broad end of an eyed probe may be passed under it, so as to lift it out, or a sharp-pointed instrument may be stuck into it, which will fix it to its situation, and bring it more within the management of the surgeon.

“The cartilages being all extracted, the cut edges of the wound are to be brought together, and, by means of a compress of lint, not only pressed close to one another, but also to the parts underneath, in which situation they are to be retained by sticking-plaster, and the uniting bandage.”

Union by the first intention being the great object after this operation, Mr. Home directs that, in order to prevent an inflammation upon the joint, the patient should be kept in bed with the leg ex-

tended, till the wound unites, or at least till there is no probability of inflammation taking place.

SECT. IV. Of SPINA BIFIDA.

Spina Bifida, is a tumor which sometimes appears upon the lower part of the spine in new-born children. A fluctuation is distinctly perceived in it, and the fluid it contains can in some measure be pressed in at an opening between the vertebræ. In some cases this opening is owing to a natural deficiency of bone; in others, to the separation of the spinous processes of the vertebræ.

The disease proceeds from serum collected within the coverings of the spinal marrow. It is always fatal. Children labouring under it have been known to live for two or three years; but, in general, they linger and die in a few weeks. All that art has been able to do is to support the tumor by gentle pressure with a proper bandage. When a tumor of this kind is laid open or bursts, the child dies in a few hours. A tumor nearly of the same nature with this is sometimes met with in different parts of the head in new-born children: it is formed by a fluid lodged beneath the membranes of the brain, which have been forced out at some unossified part of the skull. What we have said with respect to the former is exactly applicable to this.

In treating on the lumbar abscess, Mr. Abernethy has suggested, that his mode of letting out fluids contained in sacs by a valvular opening might prove useful in spina bifida. He describes the following instance of this disease which occurred to him; but in it the circumstances were such, that little could be hoped for from any means that could be employed.

"A child, about four months old, was brought to St. Bartholomew's hospital for advice. From its screaming violently at times," says Mr. Abernethy, "and being also occasionally affected with strabismus, I thought there might be some disease within the head; but yet the child sucked heartily, and its bowels were in a natural state. But the complaint which principally required attention, was a spina bifida; the tumor was as large as an orange, and the dura mater which formed the sac, had protruded through a vacancy in the upper part of the sacrum. The integuments covering the tumor were as thick and inelastic as the upper leather of a shoe, except at one part, where ulceration had lately taken place, and formed an opening through which the fluid contained in the dura mater had just begun to escape. The thickened state of the integuments probably arose from a variety of irritating applications being employed to disperse the tumor. As I knew that the child must shortly perish if nothing were done, I punctured the swelling at some distance from the ulcerated part, and let out six ounces of perfectly limpid fluid. I then closed the aperture by means of sticking-plaster,

dress the sore with mild salve, and afterwards laying a compress over the whole, made a slight degree of pressure on the part by applying moderately broad slips of sticking-plaster over the compress. Upon removing these dressings the second day after the operation, I found the puncture quite healed, the ulcerated orifice closed, and the sore having a healthy appearance: the sac was now about half filled. In two days after, the ulcer was much better, and the sac nearly full. I now again discharged by puncture about the same quantity of limpid fluid, and afterwards applied the compress in the same manner. The thickened skin fell into wrinkles when the fluid was let out, but shewed no disposition to contract. The puncture was repeated every fourth day for six weeks, during which time the child's health continued unaffected; but the great obstacle to recovery still remained, viz. want of contractility in the skin, the dimensions of which did not seem to have varied from what they were at first. The plaster which covered one of the punctures being now by some accident rubbed off, the fluid continued to ooze out; nor could this orifice be afterwards brought to unite. The discharge gradually changed from a limpid to a puriform appearance; and in a few days the child died, but with much less pain, convulsion, or signs of inflammation, than in any case that I had seen.

"When the body was examined, I discovered more than one error in the formation of the spine and parts connected with it. There was not only a deficiency of bone, which allowed the dura mater to protrude and elevate the integuments in the manner already described, but the medulla spinalis, or a substance of an apparently similar nature, was continued into the sacrum, and there joined to that part of the dura mater which made the front of the bag. The nerves composing the cauda equina went off at their usual place. But there were other nervous filaments which arose from the unnatural prolongation of the medulla spinalis mentioned above, and which, like it, terminated in the dura mater forming the sac.

"In some cases of spina bifida, the skin covering the tumor has not a natural texture; but in this case the diseased state of it was the effect of improper treatment. Under such circumstances, much benefit cannot be expected from this mode of treatment; but where the integuments are sound, and naturally elastic, and where the malformation consists merely in a defect of a spinous process, I entertain hopes that a gradual contraction of the sac may ensue, if it be occasionally emptied and moderately compressed. This unsuccessful case is related, as it shews, that, where the circumstances are more favourable, the attempt at a cure may at least be made without any hazard."

SECT. V. Of SCROFULOUS TUMORS.

We shall here mention only the surgical treatment of scrofulous tumors, having spoken of scrofula, and scrofulous ulcers, in other

parts of this work. Some authors have recommended poultices, &c. to bring scrofulous tumors to suppuration; but the best practitioners have laid them aside, because they increase the soft and spongy state of the parts, by which they are prevented from healing.

As external applications are ineffectual, it is better to allow scrofulous tumors to be as much exposed as possible, as this frequently renders the subsequent ulcer more easily cured. The other methods recommended for discussing these tumors are, the internal use of cicuta, burnt sponge, muriated barytes, a long-continued use of the cold bath, particularly of sea-bathing, and drinking mineral or sea water. These, to produce any effect, should be begun early, while the tumors are small, and long persisted in. When the tumors come to a state of suppuration, if they are seated upon the thorax or abdomen, or any of the large joints, free vent ought always to be given to the matter to prevent its bursting into these cavities; and when the abscess is large, this should be done with a trocar, or by passing a cord through it, in order to exclude the external air. When the tumors are not situated upon great cavities, it is better to allow them to break of themselves, as the sores commonly heal more readily, and the scar is pretty similar in both. The most proper applications to scrofulous sores seem to be those of the saturnine kind, as they diminish inflammation, and in some measure prevent the sore from spreading. When the bones become carious, they are to be treated like carious bones from other causes; but amputation cannot be attended with certain advantage, as the disease proceeds from a fault in the constitution. After the sores are healed up, the introduction of an issue may assist in preventing their return.

Tumors of a scrofulous nature are apt to be mistaken for those of the scirrhus kind, and thus may be improperly extirpated. Scrofulous tumors deeply seated commonly have a degree of firmness, which, if they happen to be seated near a suspicious part, as close by the side of a woman's breast, may give occasion to such a mistake. But they may generally be distinguished by the softness even of the firmest kind of them, when compared with scirrhus. They have always a smooth equal surface; whereas scirrhus is somewhat unequal or knotty, and seated in the real substance of the gland; and a shooting pain is commonly felt in it from time to time, even from its first appearance. They are generally accompanied, too, with other symptoms of scrofula, which is not necessarily the case with scirrhus.

It is a received opinion among surgeons, that scrofulous indurations should by no means be treated with topical stimulants, on account of the increased difficulty of the cure after an abscess has been produced by them. Mr. Underwood, whose remarks we shall next introduce, seems to countenance a different line of conduct.

"I know," says he, "it is an opinion with *some people*, that *scrofulous swellings* ought not to be invited to suppuration; though not from an idea that they will heal less kindly in consequence of early maturation, but solely from the difficulty of healing them whenever suppuration takes place, and the abscess is burst. But since scrofulous tumors, and particularly those of the neck, almost constantly end in suppuration at one time or other, though not at all invited to it by art; and since experience has proved the very considerable advantage of bringing them to an early and copious maturation, which both prevents so much of the glands being affected, and occasions a more perfect dissolution of that which is already distempered; I can confidently advise the early use of the suppurative epithem (consisting of a mixture of *honey, flour, the yolk of an egg*, and a little *yeast*) in preference to every other remedy, unless it be convenient to make trial of sea-bathing. It will be a means of preventing many of the sad effects of leaving these tumors for months, and even years to themselves (as I have seen them), in habits of body so ill calculated to get rid of disease; and wherein medicine is universally acknowledged to afford so little assistance.

"But should a scrofulous tumor in this part be unusually large, it may be treated in a somewhat different manner; it should, however, be *speedily brought to suppuration*, by the *epithem* already mentioned; or should this be done to our hand, as it will consequently contain a good deal of pus, the gland will thereby be already considerably dissolved. On this account, there will not only be less occasion for so bold a use of the precipitate, but the extent of the tumor being considerable, it will be of consequence to preserve a good deal of the skin, if there be no objection to doing it. Therefore, if that is not in a very bad state (which it frequently, indeed, is, before large tumors suppurate plentifully), it will be found very convenient to open the abscess, by making only a puncture with a lancet, first at the top, and then at the bottom of the tumor, sufficient to pass a seton through it; or it may be done at once by a small seton-needle, armed with a slender skein of cotton or silk. Besides every other advantage of this method of discharging the matter, which will also be gradual, is the exclusion of air; a point scarcely enough attended to in the treatment of abscesses. The seton being introduced, should be drawn up and down at least twice every day, and sometimes be moistened with some proper deterfive ointment; and occasionally sprinkled with precipitate. The constant irritation of the seton will tend to dissolve the remaining hardness of the gland, far more than any common poultice, which frequently serves only to destroy the skin, without affording that stimulus to the parts underneath, which this sore always requires. The irritation of the seton will also dispose the bottom of the abscess to throw up healthy granulations, the moment the hardness is dissolved, and the sore will thereby heal up kindly, more expeditiously,

and with much less scar, than could be expected from the extent of the tumor; no more than the marks of the punctures, and a little redness of the skin, as it was observed, remaining afterwards to be seen.

“Should the punctures made by the seton, however, not be disposed to heal in a reasonable time, after the silk is withdrawn (which should be gradual, by removing a few threads at a time), and yet no fresh hardness take place, nor the discharge be increased, the little orifices may be easily dried up, by dressing them twice a-day with bits of lint dipped in a mixture, consisting of a little *new milk*, and a drop or two of *aq. litharg. acet.* (the *Cremor lithargyri acetati* of the Pharm. Chirurg.) which by this means will be thickened to the consistence of a liniment: and becomes a very useful application to many other very troublesome ulcers.”

When tumors of a scrofulous nature, either by accident or design, become open sores, they require to be treated as directed in the section on *scrofulous ulcers*. To what is there offered; however, we will add Mr. Underwood's observations on the application of *hydrargyrus nitratus ruber* to “these troublesome sores.”

“I have now,” says he, “for some time, used the *precipitate* with great freedom in scrofulous affections of the neck, and to very great advantage.—If the swellings are at all disposed to come forward, but are not broken, or have only a small orifice, I always hasten the *maturation*, and the dissolution of the skin as far as it is diseased (by means of the epithem already described). I am very little concerned to what extent the sore may run, as I know I shall have much distempered gland to destroy underneath, and that if the latter be not effectually done, the sore will either not heal entirely, however small it may become, or will soon break out again. The scars, however, are even smaller, than when the ulcers are treated in the ordinary way. For the skin, in this part, being thin, frequently loose, and yielding; the tumor beneath it removed, and the sores healing up much sooner than under the lenient method; I have known them, when cured by the above means, leave no more than a seam, and a little redness to be observed afterwards, without any great scar on the part.”

“The only disagreeable circumstance that can attend such a practice, I apprehend, is the possibility of a *salivation*, of which I can say only, that it has never happened to me; though before I relied so much on external means as I now do, I have given mercurial medicines in small doses, for some time, whilst I have made use of precipitate daily with great freedom. Moreover, as it is very common to prescribe sea-water, or some other laxative, in these cases, the risk of a salivation, I imagine, will in general be very little. But should even symptoms of it appear, every practitioner, as he will know the cause of it, will immediately take care not to increase it.

"I am now, however, persuaded, there will generally be little or no occasion, for administering mercurials inwardly, or any other medicine under the idea of an alterative (at least, I am afraid, we know of none peculiarly adapted to the disease), much less for frequent purges, which serve only to reduce the *vis vitæ*, which, in these cases, is always too languid already. I find likewise, that the sores heal up as kindly without, as where mercurials, antimonial, cicuta, neutral salts, or sea-water, are made use of, all of which I have formerly prescribed with great freedom; and I doubt not that the plan I mean to recommend, especially when this disease is confined to the neck, will be very frequently successful in the hands of every other gentleman, who may give a fair trial to it.

"If the patient is unhealthy in other respects, such medicines should be directed as appear suitable to his complaints, when the bark will, I believe, be frequently found as useful as any; and I have found evident good effects from a strong decoction of the woods, and crude antimony. But in a general way, I depend upon nothing so much as procuring a good and *early maturation of the tumors*, and suppuration of the distempered skin and glands, by means of the aforementioned *epithem*; a very bold and continued use of the precipitate; a nourishing diet, and as much exercise as the patient can well bear; esteeming walking the best of all. To this end, the patient should be encouraged to be continually on his feet, and abroad in the air as often as the weather will safely admit of it; and of whatever age he be, after beginning this exercise in a way that shall be quite agreeable, to increase it daily, till he shall go to bed every night somewhat fatigued. Of the advantage of this, I have had such proofs, as leave me no room to doubt of the propriety of venturing to recommend it, as far as such experience may be supposed capable of doing it.

"To obtain the advantages that have been hinted from the use of the precipitate," continues the author, "scrofulous ulcers should be *filled* with it; and if a slough is formed by it (which will not always be the case), the suppurative epithem is the best dressing till the slough is thrown off; when the precipitate should be immediately repeated. The first, and a very early advantage, from such a use of it, will be a change in the discharge, both in quantity and quality, which from having been too little, or from an abundance of corroding sanies, will be changed to a moderate discharge of good and laudable pus; and the sore, except when a slough is produced by the application, will always look clean. In a little time there will also be a favourable change in the parts contiguous to the ulcer, the swelling will subside, and from a red and heated appearance, the surrounding skin will acquire its natural colour, and the patient himself, or his friends, will be able to judge of the favourable turn in his case.

"I have advised a daily use of the precipitate, which, indeed, I intend almost literally; for when a good deal of the gland has been destroyed, the sore and surrounding skin will be found to contract under the use of it, as if an astringent application were made use of; and the parts will actually heal up to the breadth of a straw, whilst this active mineral, which has already destroyed a cluster of distempered glands, is daily applied.

"I have elsewhere taken notice, that *electricity* has been found very serviceable in these sores, and that it becomes so by communicating powers to the parts. But it will be further necessary to remark, that it not only forwards maturation in such tumors as are previously disposed to suppurate, but does it in the most advantageous manner, as well as expedites their healing, and often without so much as a scar. For tumors brought on by this means to suppuration, frequently break only into very small apertures, from which, however, the matter runs very freely by the daily use of electricity; and when they are disposed to heal, the skin on the surface becomes attached again to the parts below, and only perhaps half a dozen very small specks, in the form of so many pin-holes, remain."

The use of *maturing epithems* and of *precipitate to sores*, is a revival of the practice of the celebrated Wiseman and the surgeons of his time, and certainly is a practice not to be forgotten. We cannot, however, dismiss what has been said of the propriety of bringing *scrofulous* tumors to suppuration, without observing that all experience (but Mr. Underwood's) seems to forbid it, so long as the tumor is in an *indolent* state.

SECT. VI. Of the BRONCHOCELE.

This is a tumor on the forepart of the neck, seated between the trachea and skin, termed in French *goitre*. In this country it is very rare; but it is frequent among the inhabitants of the Alps, and other mountainous countries, and is supposed to be owing to the use of snow-water. It is seated most frequently in the thyroid gland; though in two cases examined by Mr. Benjamin Bell this gland was diminished from the compression of the tumor, which was chiefly formed of condensed cellular substance, with effusions in different parts of it of a viscid brown matter. Dr. Prosser considers bronchocele as a dropical affection of the thyroid gland; and in confirmation of this, he gives an account of a dissection of a diseased gland of this kind by Dr. Hunter, who found in it a great number of capsules filled with water. The swelling is at first soft, without pain or any evident fluctuation, and the skin retains its natural appearance; but as the tumor advances in size, it becomes unequally hard; the skin acquires a copper colour, and the veins of the neck become varicose; the face becomes flushed, and the patient com-

plaints of frequent head-achs, as well as of stinging pains through the body of the tumor.

Frequent frictions are found useful, especially when employed early: saponaceous and mercurial plasters, too, have in some cases proved serviceable; and repeated blisters have been known to retard its progress. In the enlarged and scirrhus state of the tumor, no remedy yet known is powerful enough to discuss it. When the disease is far advanced, the removal of the tumor by an operation must be attended with great danger, on account of the enlarged state of the arteries; as well as its vicinity to the common carotids. It is therefore thought by some of the most experienced practitioners, that the cure should rather be attempted by internal remedies; and in fact, these are very often found to succeed when the disease has not been of too long standing. The following formula and the accounts annexed to it, appear in the *Pharmacopœia Chirurgica*:

(No. 52.) R Spongiz uszæ drach. fs.

Mucilaginis arabici gummi q. f.

Fiat Trochiscus.

In the cure of the bronchocele, the internal use of burnt sponge has, for some time, been considered as a most efficient remedy. It has been joined, by different practitioners, with many other ingredients, and administered in a variety of shapes. Dr. CHESTON of Gloucester has found it to succeed in a great number of cases, when employed agreeably to the above formula, and subject to the following regulations, which certainly appear to be an improvement on the methods recommended in the *Coventry receipt*, which we shall presently insert.

When the tumor appears about the age of puberty, and before its structure has been too morbidly deranged, a pill, consisting of a grain or two of calomel, must be given for three successive nights, and, on the fourth morning, a saline purge. Every night afterwards, for three weeks, one of the troches should, when the patient is in bed, be put under the tongue, suffered to dissolve gradually, and the solution swallowed. The disgust at first arising from this remedy, soon wears off. The pills and purge are to be repeated at the end of three weeks, and the troches had recourse to as before; and this plan is to be pursued till the tumor is entirely got the better of.

The receipt given by Mr. Wilmer as the means used by Dr. Bate of Coventry for the cure of his daughter, and which afterwards grew into so great celebrity, is much more elaborate. A bolus, including ten grains of calcined sponge, and the like quantity of calcined cork and burnt pumice-stone, was ordered to be administered thus:

“The day after the moon hath been at the full, the patient is to take a vomit, and on the succeeding day a purge. On the third night, going to bed, the above bolus is to be placed under the

tongue, and, being allowed to dissolve gradually, is to be swallowed. This is to be repeated for seven nights, and in the forenoon of each day, a powder is to be given, consisting of flowers of chamomile, gentian root, and seeds of the lesser centaury, each in powder, five grains. On the eighth day, the purge is to be repeated; and in the wane of the succeeding moon the same process is to be commenced, and repeated a third time, unless the disease is cured before. The vomit is only to precede the first course of medicine."

In another recipe, the bolus consisted simply of the calcined sponge, in the dose directed in the troche first mentioned; but the directions with regard to the bitter powders, &c. were the same in every respect.

The *bronchocele* has, most undoubtedly, been cured in a number of instances by the exhibition of burnt sponge. In common with other scrofulous affections, it is not difficult to suppose, that the stimulus given to the intestines by an occasional dose of calomel as a purge, is of service; but it is a question, whether the periodical discipline held forth in the Coventry remedy, is not of too empirical a description; and whether the weak habits in which scrofula usually exists, may not be injured by so free a use of evacuates.

Mr. Prosser, in his account and method of cure of the *bronchocele* published in 1771, recommends the following remedy:

(No. 53.) R Hydrarg. sulphur. rub. ʒj.

Milleped. in pulv. trit.

Spong. ust. sing. gr. xv. Misce.

This powder he directs to be taken an hour or two before breakfast for a fortnight or three weeks. The patient is then to abstain from medicine for a fortnight, at the end of which he is to have recourse to the powders as before, and also to take the *mercurial pill* of the old London Dispensatory, from five to ten grains at a dose, according to the age and strength of the patient, and according to its immediate effects on the bowels.

By the use of these remedies, he states, that the tumor generally disappeared in a month or six weeks; especially if the patient were young and the disease recent. The millepedes in the powder, however, may no doubt be omitted, not only as being inert, but adding considerably to the bulk of the medicine.

Mr. Ring, a practitioner in London, communicates to the editors of the Medical and Physical Journal, another receipt for the cure of *bronchocele*, which he accompanies with the following remarks:

"Having frequently met with cases of *bronchocele*, which were given up as *incurable* by those who had been attending them, but yielded without much difficulty to a simple and safe remedy, I herewith send the formula, which I beg the favour of you to insert in your Journal.

"I am well aware that to medical practitioners in general, burnt sponge is known to be the basis of the Coventry remedy, and to

have been often given for this complaint; but, nevertheless, facts warrant me to affirm, that either the cure of the disease is not in general well understood, or that the means are not employed with due regularity and attention.

"I have many times known external stimulants, and mercurials, tried in vain; and sometimes the *spongia usta* itself inwardly given in other forms to no purpose; yet in the following manner it has succeeded:

(No. 54.) *R. Spong. ust. ʒij.*

Pulv. gum. Arab. ʒij.

Pulv. cinnam. ʒss.

Syr. simpl. q. s. ut fiant trochisci xxiv.

"Care must be taken that no more syrup be used than is absolutely necessary to make the dry ingredients properly cohere; for which reason it must be added slowly, and the mass must be beaten well. The lozenges are to be dried before the fire, on a plate that has been slightly oiled, to prevent them from sticking; and must be kept in a bottle, or in a gallipot, tied over with skin.

"One of them is to be taken twice or three times a-day. I have known an instance where one was taken twice a-day, for a great length of time, to no purpose; but when the number was increased to three, the good effect was soon evident.

"Whether this medicine acts locally, and, if it acts locally, whether it is conveyed to the thyroid gland by means of absorbents not hitherto discovered; or whether the thyroid gland is a mucous gland, and is stimulated to excretion by the action of this medicine on the neighbouring parts, I shall not pretend to determine. Suffice it to say, that I have cured a considerable number of persons of the bronchocele by this remedy, some of whom began to suffer much, and to be seriously alarmed, on account of the difficulty of deglutition and respiration, with which their complaints were at that time attended.

"Burnt sponge, it is well known, and has long been well known, is the most common remedy that is tried for the cure of this disorder; but I have had frequent opportunities of knowing that it generally fails to effect a cure. This must proceed from the difference of the quantity given; or of the mode in which it is given. Some have administered it in the form of a soft bolus, to be dissolved in the mouth. If its virtue depends, in any degree, upon its topical action, that must be very transient, unless the composition be dried."

Some years ago, he sent a paper on this subject for publication to the editor of a Medical Journal, who expressed a wish on the subject of his endeavouring to ascertain whether the *spongia usta* really cures the disease in a shorter space of time, when *exhibited in this manner*, than when *swallowed at once*. Mr. Ring makes the following remarks:

"I have made many attempts," says he, "to decide this point; but, owing to the obstinacy and impatience of the persons who have laboured under the disorder, and other circumstances, I have hitherto been baffled in my endeavours. The frequent occurrence of the disease, and the frequent disappointments that attend the ordinary modes which are employed for its removal, induce me to think that the publication of this formula may be useful, and ought not to be longer delayed.

"In these troches the dose of *spongia usta* is a scruple. Some have recommended only that quantity, or perhaps only half a scruple, once a-day; and that only during a particular period of the moon. It is no wonder if so small a quantity of the medicine should often fail to produce a cure.

"Did not this mode of exhibiting the burnt sponge, in some measure, create disgust, and excite nausea, in many persons of a delicate constitution, such as is generally the lot of those who labour under this complaint, a much larger quantity of the medicine might be prescribed with perfect safety. The late Mr. Webb of Half-Moon-street, informed me, that he cured a large scirrous tumor of the abdomen, in a patient sixteen years old, by giving a drachm of it four times a-day, till a pound was taken.

"A kind of lozenge was prepared, and sold as a nostrum, many years ago, by a Frenchman of the name of Barbaix; in which I had great reason to believe burnt sponge was a principal ingredient. These lozenges were sold at the enormous price of one guinea per pot; and each pot contained but a moderate quantity of the medicine.

"I have seen a considerable number of letters, from various parts of the kingdom, but particularly from Blandford, and that neighbourhood, describing, in the strongest terms, the wonderful cures which had been performed by this remedy. Nevertheless, owing to the indolence of the person who prepared them for Barbaix, who was for many years a cripple, and on his own account, after the death of the proprietor, the sale was not so great as it would otherwise have been.

"When I last saw the person who prepared the medicine before alluded to, knowing that he had derived but little advantage from it of late years, owing to his being in an obscure situation, that of a servant, and that he was of a very indolent disposition, I offered to give him what I considered a reasonable consideration for his recipe, and if he would part with it on those terms, to make it public; but his demands were so exorbitant, that I could not comply with them. He then lived with Captain Wade, and had lived many years with Colonel Wade, to whose father, Field Marshal Wade, the former proprietor had been a servant.

"These particulars concerning a medicine which merits at least as high encomiums as any nostrum of the present day, will not, I hope,

be deemed superfluous. I have great reason to believe, that burnt sponge was the basis of the composition, from the colour and taste of the lozenges; and from knowing that the person who prepared them, frequently purchased and calcined a considerable quantity of that article."

SECT. VII. Of NÆVI MATERNI, CORNS, and WARTS.

Nævi materni are those marks which frequently appear upon the bodies of children at birth, and which are supposed to originate from impressions made on the mind of the mother during pregnancy. They are of various forms; their colour is likewise various; though most frequently resembling that of claret or red port-wine. Many of these marks are perfectly flat, and never rise above the level of the skin: these do not require the assistance of surgery; but in some cases they appear in the form of small protuberances; which frequently increase to a great size in the course of a few months. They appear to be firm and fleshy. They sometimes hang by slender attachments to the contiguous parts, but more generally they are fixed by broad bases. They may be removed with as little danger as any other tumor of the sarcomatous kind. They are supplied indeed more plentifully with blood than most other tumors are; and even sometimes they appear to be entirely formed by a congeries of small blood vessels; but the arteries which supply them may, for the most part, easily be secured by ligature. The operation should never be long delayed; for as the size of the vessels corresponds with that of the tumor, they sometimes are so large as to throw out a good deal of blood before they can be secured. In performing it, the tumor is to be cut out, the arteries taken up, and the remaining skin brought as well together as the nature of the part will allow, and kept so by adhesive plaster or suture. When the tumor is pendulous, and connected only by a narrow neck, it should be extirpated by ligature.

Corns are small hard tubercles, commonly situated on the toes or other parts of the feet, and sometimes on the hands. They are of a horny nature. They proceed from a diseased state of the cuticle, occasioned by pressure. The part becomes hard and thickened, with a small white substance in the centre, which has a disposition to become prominent. It likewise forms a depression in the subjacent cutis vera, and sometimes is said to penetrate it. When corns are situated on parts much exposed to pressure, they irritate the skin, and produce an increased sensibility of the part, and thus occasion much pain. The best preventive of corns is the wearing of easy shoes, and avoiding every kind of pressure; and unless this be attended to, it will be found difficult to keep free from them.

Various remedies are recommended for the cure or removal of corns. One is to bathe the part about half an hour in warm water, then to pare as much off them as possible without giving pain, and to apply over them any adhesive plaster. If this treatment be frequently repeated, while pressure from shoes is prevented, they generally fall off, and do not return if pressure be afterwards avoided. Another method is to allow them to grow to some length through pieces of perforated leather, properly secured by plaster or by any other means, and afterwards to cut round their root, by which they may for the most part be easily turned out. Or if such irritating substances be applied to them as will raise a blister by separating the cuticle from the cutis, the corn will be raised along with the cuticle, and may then be readily removed by a scalpel or scissors. The surface of the cutis being now exposed, is to be healed like any other part that has been blistered.

Warts are small, hard, indolent tumors, with a rough surface, appearing on different parts of the body, chiefly the hands and face, and more commonly in young people. When they appear in advanced life they are apt to degenerate into cancer, especially when of a livid colour, and with a smooth surface. If they do not prove troublesome, nothing should be done to them, as they generally either fall off or waste gradually away. When from their size or situation they require to be removed, this, if they are pendulous or have narrow necks, is easily done by ligature; but if their bases be broad, the scalpel or escharotic applications will be necessary. As few, however, will submit to the former, the latter are generally employed. Escharotics of a mild nature give least pain, and are least apt to excite inflammation, which in these cases it is difficult to remove, and are found to be quite sufficient for the purpose. One of the best of these is crude sal ammoniac: it should first be moistened in water, and then well rubbed upon the warts two or three times a-day. Liquid salt of tartar, and sometimes spirit of hartshorn, have answered the same purpose: some recommend also the juice of onions. But the most effectual remedies of all are the *tincture of muriated iron* applied daily, or a *solution of nitrated silver* in nitric acid.

Warts appearing on the penis as a symptom of venereal infection, are of the same nature, and to be cured by the same means, or by a powder consisting of equal parts of *savine* and *verdigrise*. Mercury is of no advantage here, and commonly indeed does harm. When every other part of the disease is eradicated, the warts may be removed also by the knife, and the parts from whence they are cut afterwards touched with lunar caustic, to prevent them from returning: but when this method is practised, the operator ought to be certain that he has removed the wart entirely, for where part has been left, the most formidable symptoms have sometimes ensued.

SECT. VIII. Of POLYPI.

Polypi are pendulous, fleshy, indolent tumors, so called from their supposed resemblance to the animal of that name. They may be found in different cavities of the body, and originate from the inner membrane; but those which come under surgical treatment are found in the nose, mouth, throat, and outer passage of the ear, and in the vagina and rectum. They are divided into two classes; the one soft and compressible, the other extremely firm. Both of them bleed on being fretted or roughly handled. The soft kind shrivels and contracts in a dry atmosphere (this is particularly the case with those of the nose); but the firm are not affected by the influence of the weather. Their colour is commonly pale and transparent, and sometimes a deep red.

The pain at the commencement of the disorder is always inconsiderable; but increases in those of a hard nature as they increase in size. Sometimes polypi of this kind become unequal, and form ulcers over the whole surface, discharging fetid matter in considerable quantity. They are apt at this time, unless extirpated, to degenerate into cancer.

Most frequently they arise from local injury, or whatever tends to produce and support an inflamed state of the part. Scrofula and lues venerea, though considered by some authors as frequently giving rise to them, seem only to be exciting causes: for in lues venerea in particular, polypi when present remain after the disease is cured.

The *prognosis* must depend much upon their situation and their consistence. The soft kind being seldom painful, may be removed at any period with little danger; but the hard kind are generally not only painful, but more apt to degenerate into cancer, or to return after being removed. The soft kind therefore may be removed in general with success; but when polypi of a harder nature exist, the prognosis will be much more unfavourable.

With respect to the treatment.—As long as they remain stationary, they are not to be touched; but when they continue to grow, we ought to use astringent remedies, especially a strong solution of alum, a decoction of oak bark, vinegar, ardent spirits, &c. The softer kinds of polypi may frequently be prevented for a long time from increasing in size, and sometimes they even become considerably smaller. Mercury has been found rather to make them worse; caustic and other corroding applications have been of use in the softer kind, though they have not produced a cure. Setons have likewise been used with little advantage. It is therefore found necessary to have recourse to a more effectual practice; and with this view the knife, scissors, forceps, or ligature, are more generally re-

commended. The knife and scissars may be used when the roots of the tumor can be readily come at; but polyypi are seldom so situated as to render excision practicable; and even when they are, the hæmorrhagy may be attended with considerable danger. The removal of a polypus by tearing or twisting it with the forceps, Plate 1. fig. 3. is occasionally practised; but as ligatures are less painful, and fully as effectual, they are now more generally employed. The ligatures consist of wire, catgut, silk cord, &c. Different methods have been employed for passing these over polyypi, according to their different situations.

When the *ligature* is to be applied, it is to be passed double over the tumor, and conducted to the root of it by means of the fingers or by slit probes, as in fig. 4. or rings, fig. 5. as may be best suited to the shape and size of the passage. The ends of the ligature are then to be introduced into a single or a double canula, fig. 6. which is to be pushed along the opposite side of the polypus till the end of the canula reach the root of it, when the ligature is to be drawn somewhat tight, and fastened to the canula, which is to be left in the passage. The ligature is to be daily tightened till the tumor drop off. In this manner the largest polypus may be removed equally well with those of a smaller size. Should any part of it remain, it may be destroyed by caustic, and different instruments are contrived for conducting this to the root of the tumor.

What has been said of the treatment of polyypi in general, readily applies to those seated in the nose, outward passage of the ear, the rectum, and the vagina. It likewise applies to those in the throat; only that instead of passing the ligature through the mouth, it is to be passed through one of the nostrils. The operator is then to introduce one or two of his fingers into the mouth, and open the doubling of the ligature, which he is to pass over the polypus, and having pressed it down to the root of it, to proceed as before directed.

We shall conclude this section with a case of polypus uteri, which is inserted in the Memoirs of the Medical Society of London.

A woman, thirty-one years of age, miscarried in March, 1791, when six months advanced in her pregnancy. At the expiration of three weeks she was able to follow her usual employment; and continued to enjoy a good state of health for the space of three months; when a violent flooding was occasioned by her carrying a heavy load. This hæmorrhage, as well as an occasional discharge of coagula, attended with great debility, frequently returned, at irregular intervals, during the course of the following winter and spring.

In May, 1792, whenever she was in an erect position, a small whitish tumor appeared at the os externum, which she found it necessary to push back, whenever she made water. About three weeks after, the tumor became so much enlarged, that she could not

make it recede; and in a short time there appeared, on the outside of the os externum, an enormous body, of a dark livid hue, of a very putrid smell, and of size nearly equal to a bullock's heart. This state of the complaint was attended with continual thirst, want of appetite, and sleep.

From the use of fomentations and poultices, large sloughs took place; the size and offensive smell of the tumor were much diminished; and it acquired a firmer texture, and the colour of flesh. Her general health also was in some degree improved. The tumor still continued as large as an infant's head, and approached somewhat to an elliptical form. Its surface was rather irregular, and was constantly kept moist by mucus. The pedicle was more equal in its surface, and more yielding to the touch: it was about an inch in length, and six inches in circumference. The tumor itself was indolent; but by its weight and pressure occasioned pain to the parts with which it was connected. She was at times troubled with diarrhoea and night sweats.

On the death of the patient, which happened soon after, the following appearances were observable.

The tumor was much reduced in size, of a dark gangrenous hue, and when divided with the knife, proved to be a firm fleshy substance. The bladder was rather scirrhus: the uterus was in a very prolapsed state; the cervix being drawn down far without the labia pudendi, by the weight of the appending tumor. What therefore appeared as the neck of the tumor, consisted of the uterus, covered by a portion of the vagina.

No hæmorrhage occurred subsequent to the descent of the tumor. The os uteri was not to be discovered during the life of the patient, and after her death was not well ascertained. The polypus was attached to the whole mouth of the womb; or, if there were any detached parts, the vagina also was so connected with the polypus, as to give such an appearance. This was one, among other circumstances, which occasioned the complaint to be mistaken for a case of inverted uterus. "In it is held out (say the editors) a serious warning to every member of the medical profession, to investigate the nature of diseases with all possible care in their early stages. When the complaint here described, is discovered in time, the remedy is easy and well known; when it is misunderstood and neglected, it is likely to terminate a miserable existence by a painful death, as happened to the unfortunate subject of the present memoir."

SECT. IX. *Of the ANTHRAX, or CARBUNCLE.*

The anthrax or carbuncle is a dreadful tumor, which, although it frequently contains matter, is still very different from an abscess;

since the matter is extremely different from that bland fluid which we call laudable pus, and which we find in a well-formed abscess.

The anthrax is a putrid, not an inflammatory tumor, as it has been reckoned; since it has many characters which clearly distinguish it from the true inflammation or phlegmon, and which render it much more similar to the erysipelas, or what may be called the spurious inflammation.

It is a hard circumscribed tumor, seated in some part of the cellular or adipose substance, accompanied with a violent sensation of burning heat, instead of a throbbing or pulsative sensation, and attended with, and surrounded by, a discolouration of the skin, which instead of being red, as in the true inflammation, is of a livid purple hue, and has most commonly one or more black spots upon its surface. It is a peculiar character of this disease, as well as of the erysipelas, that the patient is always very languid, and the pulse so low, that it is very difficult to raise it by the freest use of the most cordial remedies.

It has been the practice of some surgeons to treat this disease by extirpation; but nothing surely can be more injudicious than to attempt to stop the progress of a disease so nearly allied to gangrene, by an ill-timed operation. Our chief dependence should be on the exhibition of medicines internally. The bark in large quantity, opium, and proper cordials, as Madeira wine, &c. should be given. Externally, to the part, lime should be applied, and all round it lint moistened in *vinum chalybeatum*. When the tumor is of the red kind, and breaks in several places, we may very properly dilate these orifices, and lay them into one; but our incisions should extend no farther than just to remove the slough, without penetrating the sound parts. In several cases of this disease, we have seen extraordinary good effects follow the use of a poultice, composed of fermenting materials, calculated to generate *fixed air* in large quantity: the *cataplasma carbonis* may probably answer the purpose best.

SECT. K. Of WENS.

The wen, or tumor of fat, which may also happen in any part of the body, and which modern writers have considered in the class of encysted tumors of the steatomatous kind, is, however, a very different disease, and requires a very different treatment. It is, to all intents and purposes, nothing more than a tumor, or increase of the volume of the fat in a part. It is therefore perfectly solid, having no kind of fluctuation, as we have observed is the case with encysted tumors, and is much more moveable and loose than they are ever found to be. Besides, these tumors have another distinction which respects their treatment; they never terminate, as the others do, in suppuration.

Pressure applied, when they are as yet small, so as to compress the fat which already distends them, and to oppose the farther increase of its bulk, we have known sometimes, though rarely, to be effectual. When that fails, there is no other remedy but extirpation. It is surprising to see what an immense volume these wens will sometimes acquire. Some of them, when separated from the body, have been large enough completely to fill a large wash-hand basin.

There are three ways suggested for extirpating or destroying these tumors; namely, by caustic, by ligature, and by the knife. The use of the first is entirely inadmissible, unless the swelling be very small, so that a single application shall be sufficient to destroy the whole of it at once. If this be not effected by the caustic, it is apt to be the means of setting up an irritation in the part, which makes these tumors degenerate into cancerous ones, to which, too frequently, they have, of themselves, a tendency.

Again, it is said by some, that when the basis of a wen is very small, in proportion to its bulk (which, by the way, seldom or never is the case), it may easily be extirpated by a ligature passed round it. But this, at best, is a very painful mode, and what is worse, most commonly proves unsuccessful; so that it puts the patient to very great torture to no purpose. It very seldom happens, indeed, that patients apply for relief, in these cases, till the wen is grown by much too large for this mode of extirpation to be in the least advisable. They bear the disease for a great length of time, whilst its growth continues without much inconvenience, and at last are only induced to obtain assistance in consequence of the increased bulk, and unmanageable weight, of the tumor; except it happens to be of a cancerous nature, in which case it becomes very painful.

These wens ought never, therefore, to be extirpated by ligature, unless they be of a pyriform shape; that is, small, and hanging only by a slender stalk, in which instance we may comply with the apprehensions of timorous persons, and substitute the ligature for the knife.

An empiric once tied one of these enormous wens, situated on the belly of a woman, and the basis of which measured at least fifteen inches round. He had been at this work about a fortnight, when, although he had assisted his ligature with escharotics, he had got no farther than about a quarter of an inch into the whole circumference of this immense tumor. The poor woman's tortures were, all this while, inexpressible, and she had only abstained from sooner applying help through the shame of having put herself into such improper hands. It was immediately extirpated with the knife, and dissected from the tendons of the abdominal muscles, to which it was fixed for a considerable extent. The operation was much more painful to her, than if she had submitted to it in the first instance, because of the great inflammation raised upon the sur-

face of the abdomen, in consequence of the previous treatment, and which might have proved fatal had it gone on much longer.

This wenny or fatty disease sometimes has seized the breasts of women. The breast is attacked through its whole substance, which swells to an enormous size, and might, by some, be mistaken for cancer. But the distinction is very evident, for besides its being free from that kind of pain which distinguishes cancer, there is one remarkable circumstance attending it, which is, that notwithstanding the immense size of the breast, yet there is not the least swelling or induration in the glands of the axilla; a circumstance which, if the complaint were cancerous, would certainly accompany it. A tumor of this kind was taken off by Mr. John Hunter, with equal success. The knowing these circumstances is very necessary to guide us in our prognostic of such cases; for the wenny tumor, however large and formidable it may appear, never gives us reason to apprehend those mischievous consequences which but too frequently attend the other kind of disease, though ever so well extirpated.

It must, however, be observed, that these wens themselves (though the circumstance happens very rarely), after they appear to have been fully extirpated, may push out a fungous excrescence, which, in spite of all the surgeon's efforts to prevent it, shall soon grow to the size of the original tumor. A deplorable case of this kind occurred, where, though the tumor was extirpated a second and a third time by the knife, and repeatedly by the ligature, while constant and persevering attempts were made to destroy and keep it down by powerful escharotics, the patient died a miserable victim to the disease, and the torture she suffered from it. It therefore behoves the surgeon to be very attentive to the first sproutings of this fungus, and, in the first instance, if it will not immediately give way to firm pressure, to apply the arsenical caustic to it, which is the most effectual in such cases.

CHAP. VIII. OF DISEASES OF THE BONES.

THE bones, as well as the softer parts, are liable to be swelled, either throughout their whole length, or to have tumors formed on particular parts of them.

Exostosis is one species of tumor of the bone. According to Mr. Bromfield, no swelling should be called so, but an excrescence continued from a bone; like a branch from the trunk of a tree. Under this head therefore is ranked the *benign node*, which may be produced by external injury, such as contusions and fractures: it can hardly be called a disease, as pain seldom succeeds, but rather a deformity.

There are risings or tumors observable on the bones which are often the consequence of venereal virus, and are termed *tophi*, *gummi*, or *nodes*. Tophus is a soft tumor in the bone; and seems to be formed of a chalky substance, that is intermediate between the osseous fibres. These cretaceous extravasations are sometimes found on the ligaments and tendons, as well as on the bone; and may sometimes be taken out by the knife. We have many instances where chalk-stones in gouty people make their way out through the skin of the fingers and toes.

Gummi is a soft tumor on the surface of the bone, between it and the periosteum; and its contents resemble gum softened, from whence it has taken its name. Possibly, by obstruction in the nutrient vessels of the bone, a rupture of some of them occasions the serous liquor to escape, which, by making its way between the fibres of the bone, arrives at its surface; and being detained by the resistance of the periosteum, its most liquid parts being evaporated, and the remainder condensed by the inflammation, and consequently this inelastic covering being stretched, it becomes inspissated, and forms this species of *exostosis*, as it is generally called. When this is the cause, and the indisposition of the habit in general got the better of, pressure by a steel instrument, adapted to the part, is the proper cure.

The confirmed *venereal node* has the appearance of a divarication of the osseous fibres; probably from some inspissated humour obstructing the nutrient vessels, but not extravasated; this occasioning an extension of the periosteum, produces a violent pain, which, when nocturnal, is the characteristic of a venereal cause. When the periosteum is thickened but the bone not affected, a course of mercury, by attenuating the obstructed humour, and fitting it to be carried out of the body by the proper outlets, will often produce a perfect cure: but when the bone itself is diseased, this method will fail. But here the division of the extended periosteum has been known to give perfect ease.

The usual method, formerly, was to apply a caustic equal to the extent of the node, which being laid bare, required exfoliation before it could be cicatrized. If the incision is made early, that is, before matter be formed under the investing membrane, it seldom requires exfoliation; and, as we often find that the bone itself is not affected, but only the periosteum thickened, we may be deceived even after a careful examination: it is therefore proper that the patient should be pretty far advanced in a course of mercurial unction before even the incision is made; for, should the tumor decrease, and the pain abate during the course, surgical assistance with the knife most likely may become unnecessary.

A bone may become carious first in its internal parts; and that from external injury, as well as from a vitiated state of the animal fluids. Authors seem not to agree to the technical term for this kind of disease of the bones; some calling it *cancer* or *gangrana ossis*;

others, *spina ventosa*, from the pointed exuberances usually attendant on this disorder of the bone; and some again *teredo*, from the appearance of the carious bone, like wood that is worm-eaten.

It is universally allowed, that this disease takes its rise from matter being formed either in the diploe, or in the marrow: whenever obstruction is begun in the vessels expanded on, or terminating in, the medullary cysts, the consequence will be inflammation, and, if not early removed, matter will form: for this reason, this case may be called *abscessus in medulla*. Whenever, then, a patient complains of dull heavy pain, deeply situated in the bone, possibly consequent to a violent blow received on the part some time before, though the integument appear perfectly sound, and the bone itself not in the least injured, we have great reason to suspect an abscess in the medulla. Children of a bad habit of body, though they have not suffered any external injury, will often become lame, and complain of the limb being remarkably heavy; and though not attended with acute pain, yet the dull throbbing uneasiness is constant. If rigors happen during the time the patient labours under this indisposition, it generally implies that matter will be formed within the substance of the bone. If the extremities of the bone complained of begin, or if it becomes enlarged throughout its whole extent, it may be known to be an abscessus in medulla, or true *spina ventosa*, as it is called: if neither of these symptoms take place, the great insensibility of the bone in some subjects will prevent that acuteness of pain usual in other parts where matter is formed, though the acrid-matter is eroding the bone during the whole time it is contained within it. This matter at length having made its way through, arrives at the periosteum, where it creates most violent pain, as well from its sharpness as from its increased quantity, occasioning an extension of the periosteum. The integuments then become swelled and inflamed, and have a sort of emphysematous feel. On being examined by pressure, the tumor will sometimes be lessened, from part of the matter retiring into the bone: from this appearance to the touch, most likely the name of *ventosa* was added to the term *spina*. When we are assured of matter being under the periosteum, we cannot be too early in letting it out, as it will save a considerable deal of pain to the patient, though probably it may not be of any considerable advantage in respect to the carious bone; for where the fluids in general are vitiated, no chance of cure can be expected from topical remedies; but where the constitution is mended, nature will sometimes astonish us by her efforts, as the carious bone will be thrown off from the epiphyses, or the teredines will be filled up by the ossific matter that flows from the parts of the bone where some of the spinæ have come away.

If proper medicines are given, the patient well supported, and the parts kept clean and dry, patience and perseverance will frequently give great credit to the surgeon. In case it should have been thought advisable to apply a trephine, to give free discharge to the matter, the

washing it away, as well as the small crumbings of the carious bone, by means of deterfive astringent injections, has been known to contribute greatly to the curing this kind of caries, after the habit of body in general had been mended.

Besides those above mentioned, the bones are liable to two opposite diseases; the one termed *friabilitas*, the other *mollities*: the former peculiar to adults, the latter more frequent in infants, though sometimes seen in adults, from a cause not known.

The bones, when deprived of their cementing liquor, by passing through fire, become friable. From repeated salivations, and in old people, they have been rendered extremely brittle; insomuch that in many subjects they have been fractured merely from their weight and the action of the muscles; but in such cases, this is not owing to the friability of the bones, but to the loss of substance, from the erosion of the bone by something acrimonious thrown on it; to which cause perhaps may be attributed the disease called *rickets* in children. The effects of scorbutic humour in rendering the bones soft in many instances have often been remarked.

By proper diet, gentle friction with coarse cloths, exercise, and cold bathing, rickety children will frequently get their constitution so much changed as that, by the time they arrive at the age of 20 years, there shall not remain the least vestige of their former disease. The epiphyses are generally most affected in this species of the disorder. For want of early attention to invalids of this sort, we find that their bones not only become soft, and yield to the powers of the muscles, but remain distorted the rest of their lives, though they have acquired a perfect degree of solidity. In such cases, correcting the vitiated juices only will not restore the bones to their natural state; therefore the assistance of a skilful mechanic is necessary both to support the parts improperly acted on, and to alter the line of direction of the distorted osseous fibres.

Though the *curvature of the extremities*, or thickness of the ends of the bones near their articulations, may give the first alarm to those who are constantly with children, yet there are other symptoms that give earlier notice than these; and had they been timely discovered by proper judges, it is highly probable that the curvature of the limbs in many children might not have happened. The belly generally becomes larger in this disease, from the increased size of the contained bowels. Nor is it unlikely but that the mesenteric glands are the first parts obstructed; obstructions of the liver, spleen, and pancreas, soon follow; the head then becomes enlarged; then a difficulty of breathing, which is generally supposed to be the effect of taking cold, succeeds; the sternum is elevated and sharp, and the thorax becomes contracted; the spine is protruded in several parts; the pelvis altered, according to the pressure of the parts within, and habitual inclination of the patient, at times, to obtain that line of

of direction in which the perpendicular from the centre of gravity may fall within the common base of the body. The extremities of the cylindrical bones, and the ends of the ribs next the sternum, become enlarged; soon after this the bones in general become soft and flexible, yielding in such directions as the strongest muscles determine by their actions.

The bones of children who die of this disorder, we observe, are not only rendered soft, but the vessels within their substance are replete with blood of a texture totally broken, and having more the appearance of thin chocolate than blood: the periosteum in many places is separated, and the intermediate space between it and the bone filled with extravasated fluid; and caries is almost as frequent as the separation of the periosteum. The muscles in such bodies generally appear pale and flabby.

Where the affection of the mesenteric glands is evident, Mr. Bromfield asserts, that after a dose or two of the pulvis basilicus to empty the intestines thoroughly, the purified crude quicksilver is by much the most efficacious medicine to remove obstructions in those glands. When the belly begins to soften and subside, the chyle passes without interruption, and the child begins to get flesh; then the cold bath becomes truly serviceable, and the decoction or cold infusion of the Peruvian bark is a proper restorative; but the cold bath used too early, or the bark given before there is a free circulation of chyle through the lacteals, would be very injurious.

The *mollities ossium*, in some cases, may be produced from a redundancy of the oleaginous parts of the blood, or from a laxity of the solids, by which the fluids are not sufficiently attenuated, nor properly blended and mixed: the consequence of which will be obstructed perspiration, the habit in general loaded with gross, phlegmatic, and serous humours, and the ossific matter not united or condensed as in a healthy state. The method of cure confirms us in the cause of these symptoms; for, by strengthening the fibrous system, by using gentle exercise, a meat diet, good air, aromatics, and cold bathing, this kind of invalids are generally restored to health.

Among the diseases of the bones we may likewise take notice of that *palsy of the lower extremities* which takes place, as is generally supposed, in consequence of a curvature in some part of the spine. To this disease both sexes and all ages are equally liable. When it attacks an infant of only a year or two old or under, the true cause of it is seldom discovered until some time after the effect has taken place. The child is said to be uncommonly backward in the use of his legs, or he is thought to have received some hurt in the birth. When the child is of age sufficient to have already walked, and who has been able to walk, the loss of the use of his legs is gradual, though in general not very slow. He at first complains of being very soon tired, is languid, listless, and unwilling to move much or at all briskly. Soon after this he may be observed frequently to trip and stumble, though there may be no impediment in his way; and

whenever he attempts to move briskly, he finds his legs involuntarily cross each other, by which he is frequently thrown down without stumbling; and when he endeavours to stand still in an erect posture without support even for a few minutes, his knees give way and bend forward. As the disease advances, it will be found that he cannot, without much difficulty and deliberation, direct either of his feet exactly to any one point; and very soon after this, both legs and thighs lose a good deal of their natural sensibility, and become quite useless. In adults, the progress of the disease is much quicker, but the symptoms nearly the same.

Until the curvature of the spine is discovered, the complaint generally passes for a nervous one; but when the state of the backbone is adverted to, recourse is almost always had to some previous violence to account for it. That this might have been the case in some few instances might be admitted; but in by far the greatest number some predisposing cause must be looked for.

Mr. Pott, who has written a treatise upon this disease, recommends it to our observation, that though the lower limbs are rendered almost useless, or even entirely so, yet there are some circumstances in which it differs from a common nervous palsy. The legs and thighs, though so much affected, have neither the flabby feel of a truly paralytic limb; nor have they that seeming looseness at the joints, nor the total incapacity of resistance which allows the latter to be twisted almost in all directions: on the contrary, the joints have frequently a considerable degree of stiffness, particularly the ankles; by which stiffness the feet of children are generally pointed downward, and they are prevented from setting them flat upon the ground.

At first the general health of the patient seems not to be at all, or at least not materially, affected; but when the disease has continued for some time, and the curvature is thereby increased, many inconveniences and complaints come on; such as difficulty in respiration, indigestion, pain, and what they call *tightness of the stomach*, obstinate constipations, purgings, involuntary flux of urine and fæces, &c. with the addition of some nervous complaints, which are partly caused by the alterations made in the form of the cavity of the thorax, and partly by impressions made on the abdominal viscera.

Mr. Pott was led to a knowledge of the true cause and cure of this disease, from observing the case of a youth of fourteen, who was restored to the use of his limbs immediately after a seemingly accidental abscess near the part. From this he was inclined to think, that the curvature of the spine was not the original cause of the disorder, but that the surrounding parts were predisposed towards it by some affection of the solids and fluids there; and he was confirmed in these suspicions by a variety of appearances, which he observed both in the living body and upon dissection of the subject after death; all which are narrated at full length in his treatise upon this subject.

"The remedy," says he, "for this most dreadful disease con-

sists merely in procuring a large discharge of matter, by suppuration, from underneath the *membrana adiposa* on each side of the curvature, and in maintaining such discharge until the patient shall have perfectly recovered the use of his legs. To accomplish this purpose, I have made use of different means, such as setons, issues made by incision, and issues made by caustic; and although there be no very material difference, I do upon the whole prefer the last. A seton is a painful and a nasty thing: besides which, it frequently wears through the skin before the end for which it was made can be accomplished. Issues made by incision, if they be large enough for the intended purpose, are apt to become inflamed, and to be very troublesome before they come to suppuration; but openings made by caustic are not in general liable to any of these inconveniences, or at least not so frequently nor in the same degree: they are neither so troublesome to make or maintain. I make the eschars about this size and shape on each side the curve, taking care to leave a sufficient portion of skin between them. In a few days, when the eschar begins to loosen and separate, I cut out all the middle, and put into each a large kidney bean: when the bottoms of the sores are become clean by suppuration, I sprinkle, every third or fourth day, a small quantity of finely powdered cantharides on them, by which the sores are prevented from contracting, the discharge increased, and possibly other benefit obtained. The issues I keep open until the cure is complete; that is, until the patient recovers perfectly the use of his legs, or even for some time longer; and I should think that it would be more prudent to heal only one of them first, keeping the other open for some time; that is, not only until the patient can walk, but until he can walk firmly, briskly, and without the assistance of a stick: until he can stand quite upright, and has recovered all the height which habit, or rather the necessity of stooping, occasioned by the distemper, had made him lose.



CHAP. IX. OF BLOOD-LETTING.

SECT. I. Of GENERAL BLOOD-LETTING.

BLOOD-LETTING is performed either to lessen the quantity of circulating fluid, or to relieve a particular part: hence we have the terms of *general* and *local* blood-letting.

General blood-letting is either performed upon a vein or an artery; and from this circumstance arise the appellation of *phlebotomy* and *arteriotomy*.

Local or topical blood-letting is performed by scarificators and cupping-glasses, by leeches, or by punctures made with a lancet, as may be most suitable to the nature of the disease it is intended to remedy.

There are some general rules and observations which relate equally to this operation in whatever part of the body it is practised: these we shall in the first place enumerate, and shall afterwards proceed to treat particularly of blood-letting in the arm and other parts.

1. In this, as in every other operation, the situation of the patient, and of the operator likewise, ought to be precisely fixed. The situation of the patient, during the operation of blood-letting, has a considerable influence on the effects produced, and therefore merits particular attention. In some disorders, it is the object of this remedy to evacuate a considerable quantity of blood without inducing fainting: when this is the case, and when from former experience it is known that the patient is liable during the evacuation to fall into a faintish state, a horizontal posture ought to be preferred to every other; for fainting is not near so ready to occur in a horizontal as in an erect posture. It now and then happens, however, that one material advantage expected from the operation of blood-letting, is the production of a state of deliquium; as, for instance, in cases of strangulated hernia, where a general relaxation of the system is sometimes desirable. In all such circumstances, instead of a horizontal posture, the more erect the patient is kept the more readily will a state of fainting be induced. The patient ought to be so placed, that the principal light of the apartment shall fall directly upon the part to be operated upon, that the vein to be opened may be rendered as apparent as possible.

2. The patient being properly seated, the next step, by means of a proper bandage of silk, linen, or woollen cloth, which has more elasticity, is so to compress the vein intended to be opened, as to prevent the blood from returning to the heart. An equal degree of pressure ought to be applied to all the other veins of the part: for if this be not attended to, the communication preserved by the collateral corresponding branches would render the pressure upon any one particular vein of very little importance. This pressure upon the veins, by inducing an accumulation of their contents, tends to bring them more evidently into view, and consequently renders it easier for the operator to effect a proper opening than he would otherwise find it. The pressure, however, ought never to be carried so far as to obstruct the circulation in the corresponding arteries, otherwise no discharge of blood can take place. When we see that it has the effect of raising the veins, while at the same time the pulsation of the artery is distinctly felt in that part of the member which lies on the side of the ligature most distant from the heart, we may be certain that it is to a very proper degree,

and that it ought not to be carried farther; for by the swelling of the veins we are sure that they are sufficiently compressed; and by the arteries continuing to beat, it is evident that a continued flow of blood may be expected.

3. The reflux of blood to the heart being in this manner prevented, the next question to be determined is, the best method of making an opening into the vein. Different instruments have been invented for this purpose; but there are two only which have been retained in use, and which are all, therefore, that here require to be mentioned. These are the lancet and the phlegm. This last, on being placed immediately on the part to be cut, is, by means of a spring, pushed suddenly into the vein, and produces an opening of the exact size of the instrument employed.

When it is determined to employ the lancet, which is by far the safest, the form of that instrument is next the object of attention. The broad-shouldered lancet ought to be laid entirely aside; because the broadness of its shoulders produces always a wound in the external teguments of, perhaps, three times the size of the opening made in the vein; a circumstance which adds no advantage whatever to the operation; on the contrary, it produces much unnecessary pain, renders it frequently a very difficult matter to command a stoppage of the blood, and the wounds produced by it are commonly so extensive as to be liable to terminate in partial suppurations.

The spear-pointed lancet, on the contrary, is in every respect well calculated for the purpose of venesection. From the acuteness of its point, it enters the teguments and vein with very little pain; which is with many patients a circumstance of no small importance. We are sure of making the opening in the vein equal, or nearly so, to the orifice in the external teguments; and the discharge of blood produced by an opening made with one of these lancets, is commonly put a stop to with great ease immediately on removing the ligature upon the vein.

4. The form of the lancet being thus fixed upon, we come now to speak of the method of using it. The surgeon and patient being both properly seated, and the ligature having been applied for a short space of time, in order to produce some degree of swelling in the veins, that vein is to be made choice of which, at the same time that it appears conspicuously enough, is found to roll less than the others on being pressed by the fingers. It is scarcely thought necessary to observe here, that when a vein appears to be so immediately connected with a contiguous artery or tendon, as evidently to produce some risk of wounding these parts in the operation, another vein not liable to such hazard, if it can be procured, ought undoubtedly to be preferred. Veins may lie directly above both arteries and tendons, and yet no manner of risk be incurred by opening them, provided the operator is sufficiently steady and at-

tentive; but it does now and then happen, that veins are so nearly and intimately connected with these parts, as to render it hazardous even for the most dexterous surgeon to attempt this operation.

The vein being at last made choice of, the surgeon, if he is to use his right-hand in the operation, takes a firm hold of the member from whence the blood is to be drawn with his left, and with the thumb of the same hand he is now to make such a degree of pressure upon the vein, about an inch and a half below the part where the orifice is to be made, as not only to render the skin and teguments somewhat tense, but at the same time to interrupt, for a little, all communication between the under part of the vein and that portion of it lying between the ligature and the thumb placed as thus directed.

The lancet being drawn out so as to form nearly a right angle with the scales, the operator now takes it between the finger and thumb of his right hand; and leaving at least one half of the blade uncovered, he rests his hand on the middle-finger, ring-finger, and little-finger, all placed as conveniently as possible in the neighbourhood of the vein from whence the blood is to be taken; and having pushed the point of the instrument freely through the skin and teguments into the vein, he now carries it forward in an oblique direction, till the orifice is of the size he inclines to have it; taking care, during the time of pushing on the lancet, that its point be kept in as straight a direction as possible, for fear of dipping into the parts below.

The instrument is now to be withdrawn; and the surgeon, removing the thumb of his left hand, is to allow the vein to empty itself freely into the vessel previously provided for the purpose.

It is of importance to observe, that during the time the blood is discharging, the member ought to be kept in exactly the same posture it was in when the lancet was first introduced: otherwise the orifice in the skin is apt to slip over the opening in the vein; a circumstance which always proves inconvenient, and on some occasions produces a good deal of trouble, by the blood from the vein insinuating itself into the surrounding cellular substance.

5. When the vein is properly cut, and the orifice is made sufficiently large, it rarely occurs that any difficulty is experienced in procuring all the blood that is wanted. But when this last circumstance occurs, from the patient becoming faint, a stream of fresh air ought to be admitted to the apartment, wine or some other cordial should be administered, and the patient ought to be laid in a horizontal posture. By these means the faintness will in general be soon removed: but if still the blood should not flow freely, the member ought to be put in all the variety of positions that can probably assist in bringing the openings of the skin and other teguments to correspond with that of the vein; which will soon be known to have happened by the blood beginning instantly

to flow. Throwing the muscles of the part into constant action, by giving the patient a cane or other firm substance to turn frequently round in his hand when the operation is done in the arm, will often answer in producing a constant flow of blood from a vein when every other means has failed: and, lastly, when the pulse in the inferior part of the member is felt very feeble, or especially if it cannot be distinguished at all, we may be thereby rendered certain that the ligature is too tight, and may in general have it in our power to produce an immediate flow of blood, by removing the compression thus improperly made upon the arteries of the part.

6. A quantity of blood proportioned to the nature of the disorder being thus discharged, the pressure upon the superior part of the vein should be immediately removed; and this being done, if the spear-pointed lancet has been used, all farther loss of blood will in general stop immediately. The contrary of this, however, sometimes occurs, and blood continues to flow freely even after the ligature is removed. When this is the case, the operator ought to compress the vein both above and below the orifice, by means of the finger and thumb of one hand, so as to prevent any further loss of blood. This being done, and the orifice being cleared of every particle of blood, the sides of it should be laid as exactly together as possible; and a piece of court or any other adhesive plaster being so applied as to retain them, it will seldom happen that any kind of bandage is necessary: but when the blood has issued with uncommon violence during the operation, and has been difficult to command after the removal of the ligature, in such instances it will be prudent to apply a small compress of linen over the plaster, and to secure the whole with a linen roller properly applied round the member.

SECT. II. *Of VENÆSECTION in DIFFERENT PARTS of the BODY.*

When venæsection is to be performed in the arm, the ligature for stopping the circulation ought to be placed about an inch or an inch and a half above the joint of the elbow, and brought twice round: in order to prevent the ends of it from interfering with the lancet, the knot should be made on the outside of the arm. In general, one knot might answer; but a slip-knot being made above the first, renders it more secure, and it is very easily done.

In making choice of a vein from whence the blood is to be taken, the general rules we have already laid down upon this point must be particularly attended to. In general the artery lies so low in this place, that the median basilic vein, under which it commonly runs, may be opened with perfect safety; and as this vein in general ap-

appears more conspicuous than any of the others, probably from the continued pulsation of the artery below obstructing in some measure the passage of its contents, it is in this respect, therefore, more properly calculated for this operation than any of the others. Other circumstances occur too which render the median basilic preferable to the cephalic or median cephalic veins for the operation of blood-letting. The former, viz, the median basilic, is less deeply covered with cellular substance; and by lying towards the inner part of the arm, it is more thinly covered with the tendinous expansion of the biceps muscle than any of the others. From these circumstances, the operation is always attended with less pain when done in this vein than in any of the others.

In very corpulent people, it sometimes happens that all the larger veins lie so deep as not to be discovered by the eye; but when they are sensibly felt by the fingers, even although they cannot be seen, they may be always opened with freedom. In a few instances, however, they can neither be distinguished by the eye nor by the finger: in such a situation, as they may in general be met with about the wrist or on the back-part of the hand, the ligature should be removed from the upper part of the arm; and being applied about half way between the elbow and wrist, the veins below will thereby be brought into view; and wherever a vein can be evidently observed, there can be no danger in having recourse to the operation.

We have, in another place, spoken fully of the *mischiefs which occasionally happen from bleeding in the arm*, and have there given the opinions of Mr. Hunter and others as to their supposed cause; notwithstanding this, it is impossible to overlook the ingenious remarks made on this subject by Mr. Abernethy, one of the surgeons of St. Bartholomew's hospital, in one of his surgical essays. After noticing the confused and general way in which most of those who have written on it have treated the subject, Mr. Abernethy proceeds, in the following way, to lay down *several distinct causes* from which inconveniences from phlebotomy may arise to the patient. These are,

1. *Inflammation of the integuments, and of the subjacent cellular substances.*—"The inflammation, and suppuration of the cellular substance," says he, "in which the vein lies, is the most frequent occurrence. Of this every surgeon must have seen repeated instances; they may also have remarked, that on the subsidence of this inflammation, the tube of the vein is free from induration: neither does the state of any of the surrounding parts, indicate their previous participation in the disease. The nature of every excited inflammation will vary as the cause which produced it, and the constitution of the patient determine, it will therefore be unnecessary to particularly notice the varieties of its appearance. Sometimes the inflammation will be more indolent, and will produce a circumscribed, and slowly suppurating tumor. Sometimes it will be more diffused, partaking more of the nature of erysipelas: and sometimes its vio-

lence, and rapid termination, will evidently distinguish it to be a phlegmon.

"If the lancet with which the patient was bled, should have been bad; if it lacerated rather than cut the parts through which it passed; if the constitution of the patient be irritable; and more particularly, if sufficient attention be not paid to procure the union of the divided parts, but the motion of the arm be allowed: the irritation, which the friction of the opposite edges of the wound must occasion, will most probably excite inflammation. The treatment proper to be pursued in this complaint is manifest, and distinguished by no peculiarity; I shall therefore postpone what I have to say on that subject, until I have noticed the other varieties of these diseases."

2. *Inflammation of the absorbing vessels.*—"The next frequent complaint, which I have seen, is inflammation of the absorbents: it however sometimes accidentally happens, that one surgeon meets with many cases of a similar nature, so that were he to judge merely from his own observation, he might conclude that disease to be common, when the collected experience of others would determine it to be a rare occurrence. I am inclined to suspect, that my observation has been thus partial, since Mr. Hunter has not publicly noticed this complaint. I think I cannot give a better history of the commencement, appearances, and event of this disease, than by relating three cases, of the circumstances of which I took an account. It is right, however, to mention, that I have seen two others, of which I took no minutes; and which I am unwilling to relate only from recollection."

Of mischief from this cause, Mr. Abernethy presents us with the following cases.

CASE I. "A lady was bled in the *vena mediana basilica*; the wound did not heal, nor was sufficient attention paid to preserve the arm quiet. Eight days afterwards I was consulted, in consequence of the patient being alarmed by the appearance of two swellings; one was situated about the middle of the arm, over the large vessels, the other on the fore-arm, about the mid space between the elbow and wrist, in the integuments above the flexor muscles. The upper swelling measured rather more in circumference than an egg, the other was of smaller dimensions; they were not very painful; they were moderately firm in their texture, and so exactly resembled those tumors which form round irritated lymphatics, that no doubt could be entertained of their nature. The orifice made by the lancet was not healed, the integuments for about one-fourth of an inch surrounding it were, in a slight degree, inflamed and thickened. No induration of the venal tube could be distinguished either at this time, or after the subsidence of inflammation.

"The account which I obtained from the patient of the attack of this complaint was, that the wound inflamed, became painful, and discharged matter; that the gentleman by whom she was bled

had dressed it with salve, but did not restrain her from using her arm; that about five days after the operation she had felt pains shooting from the orifice, in lines, up and down her arm, and upon pressing in the course of this pain, its degree was increased. This account induced me to examine the arm attentively, and I could plainly feel two indurated absorbents, leading to the superior tumor, but could not perceive any extending to the lower one. The wounded part was dressed with mild salve; a bread and milk poultice was applied to both tumors; and the arm was supported by a sling, without motion or exertion. The integuments surrounding the orifice lost their disposition to inflame, and the wound gradually healed; during five days the tumors underwent no evident alteration; the poultice was changed to one of bread, water, and acetum lythargyritum, cum tinctura opii, under which they quickly diminished and dispersed.

CASE II. "A man about 35 years of age was admitted into St. Bartholomew's hospital, under the care of Mr. Pott: he had been bled in the country, about a fortnight before his admission; since that time he had been extremely ill, and was with difficulty conveyed to London. The state in which he was admitted, I shall describe: his whole arm was greatly swoln, the wound made by the lancet was not united, the parts immediately surrounding it did not seem to be affected by distinct inflammation, but partook of the general tumefaction. Two large abscesses had formed, one situated near the inner edge of the biceps muscle, about the middle of the arm, and the other on the inside of the fore-arm. The patient told us that he had been bled on account of a pain in his side; that the orifice, instead of healing, had festered; that he had for a time pursued his daily employment, notwithstanding the pain which he suffered; that this, however, soon became too violent to be endured, and the swelling extended towards the armpit, where the glands became enlarged. Inflammation next attacked the fore-arm; and after suffering extreme pain and fever, these abscesses had formed, and since that time his illness and pain had in some degree abated. Mr. Pott opened both abscesses, and directed his whole arm to be covered with a poultice. The patient was kept in bed, and medicines likely to alleviate inflammation were prescribed. In about four weeks the arm was reduced nearly to its natural dimensions. The orifice through which he was bled had united, and the wounds by which the abscesses had been opened were nearly healed. The parts surrounding them, however, still remained thickened, and also all the integuments on the inside of the arm. In these thickened integuments, three chord-like substances, evidently absorbents, were to be distinguished; they extended from the punctured part to the superior abscess; and again above this, two were continued even to the axilla. Two other indurated absorbents also were extended from the punctured part to the inferior abscess. The punctured vein being attentively examined, was found to be a little thickened,

both above and below the orifice; it had, however, no connection with these chord-like substances, they were superficial, and their appearance, course, and every other circumstance, clearly shewed them to be indurated absorbents. The hardness of these vessels and of the integuments had much diminished, and the patient had regained the strength of his arm, before he was discharged from the hospital.

CASE III. "A poor man was bled in one of the bleeding shops of this city. His operator dipped some rag in the blood which he had taken, applied it to the orifice, and bound it on the arm with a tape. The patient felt much pain in the wound, even from the time of the operation, and experienced much difficulty in moving his arm. As the rag stuck closely to the orifice, he was unwilling to remove it; however, on the third day the violence of the pain induced him to take it off: he then found the parts surrounding the puncture inflamed and hardened. The patient had also suffered much pain, which extended towards the axilla, and one of the glands there was swollen. He anointed the arm with some ointment, but the pain so increased that he could scarcely bear it to touch his side. The integuments about the middle of the arm were elevated by a tumor, which was painful when pressed: the base of it was not circumscribed, but was gradually lost in the surrounding parts. In this situation he requested my advice. I gave him some mild salve to dress the wounded part; I directed him constantly to keep applied to the integuments, covering the inflamed lymphatics, some cloths wetted with the cold aqua aceti lythargyriti cum opio, to keep his arm completely supported by a sling, and to take some gently purgative medicine.

"This he did; the inflammation gradually subsided, and the wound made by the lancet healed."

In order to obviate any suspicion that, in the foregoing cases, the lancet employed was *envenomed*, and that the *absorption of virulent matter* caused the inflammation, Mr. Abernethy proceeds to make the following remarks:

"Physiology shews to us," says he, "that *the absorbents possess much sensibility*: their rejection of one kind of air, which is not evidently acrid, and their ready absorption of another, in my opinion, proves them to be endued with no slight degree of sensation. Practical observation further strengthens this opinion: the celerity with which these vessels inflame, when they have imbibed noxious matter, and the pain which is suffered in consequence, sufficiently prove this circumstance. Their frequent inflammation in consequence of disturbance of the general constitution, may be however regarded as an additional argument. A common cold produces a painful tumefaction of their glands; and in some fevers these parts are particularly obnoxious to disease.

"There is another circumstance which deserves attention; when the absorbents become inflamed, they quickly communicate this dis-

case to the cellular substance by which they are surrounded. Most surgeons have remarked these vessels, when indurated, to appear like small chords, perhaps of one-eighth of an inch in diameter; this substance is surely not the slender sides of the vessel thus suddenly augmented in bulk, but an induration of the surrounding cellular substance to which the irritated vessel has communicated inflammation. The formation of a common bubo is another instance of the power which these vessels possess of involving the surrounding parts in their disease; at first one or two glands are found to be inflamed; but they soon become undistinguishable in the general inflammation of the surrounding substance. This inflammation either is dispersed, or it terminates in suppuration: and on the subsidence of the general tumor the originally diseased glands again become noticeable. Those frequently enormous tumors which form by the side of the neck, further confirm the observation: enquire into the origin and progress of the disease, and it will be found that one or two glands were at first affected, and that the disease extended itself to the surrounding substance, of which the greatest part of the swelling is composed. This remark must be taken with some limitation, for the glands of the neck do frequently enlarge to a considerable degree, without the surrounding cellular substance partaking of the disease; yet in such cases their growth is very gradual, and unaccompanied with active inflammation. Such are the reasons which induce me to suppose these vessels to be very sensible and irritable; and to possess a power of readily communicating disease to the cellular substance in which they lie."

Mr. Abernethy next endeavours to shew that their inflammation, in consequence of local injury, is *deducible from two causes*: "one, the absorption of acrid matter; and the other, the effect of irritation of the divided tube. Of the inflammation arising from the absorption of morbid matter every one is apprised, but that which is the effect of irritation has been less remarked.

"When virulent matter," says the author, "is taken up by the absorbents, it is generally conveyed to the next absorbent gland; where, its progress being retarded, its stimulating properties induce inflammation, and frequently no evident disease of the vessel through which it has passed can be distinguished. The absorption of syphilitic and cancerous matter affords frequent proofs of this assertion. There are, indeed, some poisons so acrid, that the vessel which admits them inflames throughout its whole extent; yet still the glands are principally affected. When inflammation of the absorbents happens in consequence of irritation, that part of the vessel nearest the irritating cause generally suffers most; whilst the glands, being remotely situated, partake less of the inflammation. *The inflammation is also of a different kind*, and, I think, can be discriminated: when it arises from poison resident in the part, the gland is first indurated, and a phlegmonoid inflammation follows; but if irritation be the

cause of its enlargement, the tumefaction more speedily takes place; the gland is more painful in its early state, but has less tendency to suppurate; the enlargement more resembles that of the lymphatic glands of the neck, which is the consequence of taking cold.

“ When the inflammation arises from *irritation* it will be expected, and I believe it will be found, that the continuity of the vessel will be apparent: but it does not follow that the greatest disease will be immediately adjoining that part which has sustained the injury. The cases which have been related shew that inflammatory tumors often form in the middle of the arm, and fore-arm; when the wound of the absorbent is at the bend of the elbow. Were it necessary, I could relate several cases where such tumors formed from injuries done to the fingers, or in consequence of fretting ulcers of the leg. When they arise from the latter cause it might be supposed that some acrid matter had been imbibed, yet I think in that case we should find the glands the principal seat of the disease. It has been proved that the absorbents frequently inflame far below the part where the vessel has sustained an injury, and where the inflammation could not be occasioned by absorption. These observations I thought it right to insert, to illustrate the cases which have been related; and also to excite more general attention to the diseases of these important vessels.”

3. *Inflammation of the vein.* After a concise account of Mr. Hunter's opinion, which we have already given, Mr. Abernethy says, “ I have seen but three cases where an inflammation of the vein succeeded to venæsection; they, however, confirm the foregoing observations. The vein did not in either case evidently suppurate. In the first, about three inches of the venal tube inflamed both above and below the orifice; it was accompanied with much tumor, redness, and pain of the covering integuments, and much fever; the pulse was rapid, and the tongue furred. After the inflammation had terminated, and all tumor had subsided, the vein did not swell, when compression was made above the diseased part. The second case was of a similar nature, but less in degree. In the third case the inflammation was not continued in the course of the vein towards the heart, but extended as low as the wrist. I have no doubt, but that adhesion of the sides of the vein was the cause which prevented the extension of the disease equally in both directions. The nature of a disease being known, the treatment is commonly evident. The diminution of inflammation in a vein is to be attempted by the same general means as in other parts. As the membranous lining of the vein is continued to the heart, and as inflammation is very speedily extended along such surfaces, unless prevented by adhesion, the application of a compress at some distance from the punctured part, in order to unite the inflamed sides of the vein, appears to be particularly judicious.

"I am induced to suppose a case may occur in which *the vein may suppurate*, and in which a total division of the tube may be proper practice; not merely to obviate the extension of the local disease, but to prevent the mixture of collected pus with the circulating fluids."

4. *Inflammation of the fascia of the fore-arm.* "As far as my observation hath extended," says Mr. Abernethy, "the next frequent ill consequence which succeeds to venæsection, performed in the arm, is an inflammation of the *subjacent fascia*. When this complaint occurs, it perhaps arises not merely from the contiguity of the fascia to the punctured and irritated parts, but it is probable that it was wounded by the lancet in the operation." Sufficient information of the symptoms, and effects of this disease, are conveyed in the following cases.

CASE I. "A man, aged 40, was admitted into St. Bartholomew's hospital, under the care of Mr. Pott: he had much pain and difficulty of moving his arm, in consequence of inflammation succeeding to phlebotomy. The wound inflicted in that operation was not healed; the surrounding integuments were not much inflamed, but he could neither extend his fore-arm nor his fingers without great pain. The integuments of the fore-arm were affected with a kind of erysipelas; when slightly touched they were not very painful, but when more forcibly compressed, so as to affect the inferior parts, much pain was suffered. The patient complained of pain extending towards the axilla, and also towards the acromion; but no tumor of the arm, in either direction, was perceptible. A poultice was applied to the arm, opium was given at night, and aperient medicines were occasionally prescribed. The pain in the arm increased, and it was attended by much fever. After a week had elapsed, a small and superficial collection of matter took place a little below the internal condyle; this being opened, but little pus was discharged: and scarcely any decrease of tumor or pain followed. About ten days afterwards a fluctuation of matter was distinguished below the external condyle; an incision was here also made, which penetrated the fascia of the fore-arm. Much matter immediately gushed from the wound, the swelling greatly subsided, and the future sufferings of the patient were comparatively of little consequence. This opening was, however, inadequate to the complete discharge of the matter; which had probably been originally formed beneath the fascia, in the course of the ulna: its pointing at the upper part of the arm depended on the tenuity and comparative non-resistance of the fascia at that part. The collected pus descended to the lower part of the detached fascia; a depending opening for its discharge became necessary, after which the patient recovered without any circumstance being observed worthy relation. The case which I have just related, and that in which two large abscesses had formed, attended with indurated absorbents, occurred nearly at the same time at the

hospital, and they both fell under the care of Mr. Pott. In the lectures of that eminent surgeon, I had heard dangerous and fatal consequences attributed to the injury of a nerve in venæsection, but I learned no other distinction of cases. These cases first excited my attention to this subject, and, as far as I know, such discrimination as that which I now offer to the public hath not been attempted."

The author here speaks of another case of inflamed fascia, in which no inflammation of the vein or absorbents appeared. "The integuments were not much affected, but the patient complained that his arm felt as if bound or compressed, and that he suffered much pain if he attempted to extend it. The inflammation subsided without the formation of matter; and after much time had elapsed, the pliability of the arm was gradually regained."

In the second volume of the Medical Communications, two cases of inflammation of the *fascia*, attended, however, with some peculiarity of symptoms, may be found.

"The *treatment* of an inflamed fascia," says Mr. Abernethy, "the consequence of venæsection, has in it no peculiarity. Doubtless those general means which are reductive of inflammation should be employed. Of local treatment, quietude of the limb, and a state of relaxation of the inflamed part, will tend to lessen disease; but as soon as some abatement of inflammation is procured, the extension of the fore-arm and fingers ought to be attempted, and daily performed, to obviate that contraction which might otherwise ensue."

5. *The ill consequences succeeding to a wounded nerve* come next under consideration. On that subject, after some preliminary remarks, the author proceeds as follows:

"I shall," says he, "arrange what I have to say on this subject in the following manner: 1st, I shall explain what nerves are exposed to injury: 2dly, I shall investigate what are the effects likely to be produced by such an accident; and, 3dly, I shall enquire, what means are most likely to afford relief."

"*First*, the two cutaneous nerves are those which are exposed to injury; I dissected them, in several subjects, with attention; and found some irregularity in their distribution: most frequently all their branches pass beneath the veins at the bend of the arm; but sometimes, although the principal rami still go beneath these vessels, many small filaments are detached before them, which it is impossible to avoid wounding in phlebotomy. As I believe many surgeons retain but an indistinct remembrance of these nerves, and as I have never seen them accurately depicted in any anatomical book, I thought I should do an acceptable service by giving an engraving of them. I therefore made two drawings of them; one exhibiting their most simple course, the other their most complicated distribution. These, I conclude, are the only nerves liable to injury: it may be suspected that the median nerve might occasionally be wounded; but its situation, I think, makes this opinion improbable

If, however, a doubt should be entertained on this subject, an attention to symptoms will soon dispel it; when a nerve is irritated at any part between its origin and termination, a sensation is felt as if some injury were done to the parts which it supplies. If, therefore, the cutaneous nerves were injured, the integuments of the fore-arm would seem to suffer pain; but if the median nerve was wounded, the thumb and two next fingers would be painfully affected.

By delineations annexed to his Essay, Mr. Abernethy shews, that if the patient be bled in the *vena mediana basilica*, the branches of the *internal cutaneous nerve* are exposed to injury: or if the *vena mediana cephalica* be opened, the branches of the *external cutaneous nerves* may be wounded.

"Secondly," says he, "I wish to enquire, what are the ills likely to arise from a wounded nerve. Whoever reflects on the wonderful minuteness of the nervous fibrils, and considers their perfect distinctness from each other, although connected by a common covering of cellular substance, will scarcely imagine a partial division of a nervous fibril. If I sought to express myself strictly on this subject, I should speak of a partial division of a packet of nerves; but I shall use the commonly adopted language, and call those chords nerves, which are really composed of multitudes of separate nerves. I first beg leave to examine the opinion which has prevailed of a nerve being partially divided. Admitting that a nerve be partially divided, would it not, like a tendon, or any other substance, unite? I think there can be no doubt but that it would: I am induced to this opinion by considering that nerves of equal size with the cutaneous nerves of the arm, are distributed in considerable numbers throughout the body. In the many operations performed, and in the wounds daily occurring, I think it would be strange if a partial division of a nerve should not happen; yet no peculiar symptoms are observed usually to ensue. The pain which some people suffer from bleeding, in my opinion, indicates an injury done to a nerve. If the reader refers to the plate he will perceive that in some cases it is impossible to avoid dividing branches of nerves in phlebotomy, as sometimes they pass before the vein. I believe these to be branches so frequently wounded, that I should be surprised if they did not many times suffer a partial division. Surely, however, a half-divided nerve would unite without causing a general derangement of the nervous system. Yet it is possible that an inflammation of the nerve may accidentally ensue; which would be aggravated if it were kept tense, in consequence of imperfect division. In the cases related by Mr. Pott and doctor Monro, I believe that some days elapsed after the receipt of the injury before any alarming derangement of the nervous system ensued. Inflammation of the surrounding parts also appeared. These observations make it to me evident that the disease consists in inflammation of the injured nerve, in common with the other wounded

parts; and this inflammation I can conceive to happen with or without a total division of the nervous chord. I should consider a case of inflamed nerve as an object of great curiosity; every one, I think, will admit that it is likely to communicate dreadful irritation to the sensorium; and every one will perceive that a cure will probably arise from intercepting its communication with that important part.

“*Thirdly*, I proceed to enquire, what is the most probable method of relieving the effects arising from an inflamed nerve. The general opinion is, that the nerve is only partially divided, and that a total division would free the patient from the continuance of his sufferings. Mr. Pott supposed that the wounded nerve was situated at one or the other extremity of the wound which had been made in the vein; he, therefore, proposed to divide it totally by enlarging a little the original orifice. It is, however, possible that the point of the lancet might injure a nerve lying beneath the vein. [This Mr. Abernethy illustrates by referring to the plate.] Mr. Bell directs an extensive transverse incision to be made through the original wound; but if the injured nerve be situated at the upper or lower extremity of the orifice, it will remain unaffected by this operation. Mr. Bell also advises the incision to be continued to the bone; but this appears to me dangerous and unnecessary.

“If the injured nerve be inflamed, I think it doubtful whether even a total division of it at the inflamed part would effectually relieve the general nervous irritation which the disease has occasioned. To intercept the communication of the inflamed nerve with the sensorium does, however, promise perfect relief. This intention can only be accomplished by making a transverse incision above the orifice in the vein. The incision need not be very extensive, for the injured nerve must lie within the limits of the original orifice, and it need only descend as low as the fascia of the fore-arm; for all the filaments of the cutaneous nerves lie above this fascia. The vein which had been opened, and some filaments of the cutaneous nerves, are all the parts of consequence which will be divided in this operation. The proximity of the division of the nerve to the vein must be regulated by the supposed extent of the disease; however, as the extent of the inflammation of the nerve is uncertain, I submit it to the consideration of surgeons, whether it may not be advisable, in some cases, to divide either of the cutaneous nerves still more remotely from the injured nerve.”

Mr. Abernethy concludes by remarking that there is little difficulty in detecting the trunk of these nerves in the dead subject; and he therefore supposes but little would occur in the living state, since the compression of the tourniquet would prevent any inconvenience which hæmorrhage might cause to the operator.

We now return from this digression to the general subject of the present section.

There is only one vein of *the neck*, viz. the posterior external jugular, which can be easily brought so much into view as to be with propriety opened; and even this lies deeply covered with parts, not only with the skin and cellular substance, but with the fibres of the platysmamyoides muscle; so that a considerable degree of pressure becomes necessary in order to raise it to any height. With a view to produce this, the operator's thumb is commonly advised to be placed upon the vein, so as to compress it effectually about an inch or an inch and a half below where the opening is to be made. This, however, seldom proves sufficient for the purpose, as the blood, on being stopped in its progress through this branch, easily finds a passage to the other veins; so that unless the principal vein on the other side of the neck is also compressed, the vein to be opened can never be fully distended. In order to effect this, a firm compress of linen should be applied on the largest vein on the opposite side of the neck; and an ordinary garter, or any other proper ligature, being laid directly over it, should be tied with a firm knot below the opposite arm-pit; taking care to make such a degree of pressure as to put an entire stop to the circulation in the vein, which in this way may be easily effected without producing any obstruction to the patient's breathing.

This being done, and the patient's head properly supported, the operator, with the thumb of his left hand, is now to make a sufficient pressure upon the vein to be opened; and with the lancet in his right hand is to penetrate at once into the vein; and before withdrawing the instrument, an orifice should be made large enough for the intended evacuation. It may be proper to observe, that a more extensive opening ought always to be made here than is necessary in the arm, otherwise the quantity of blood is generally procured with difficulty: and besides there is not the same necessity for caution on this point here that there is in the arm; for it seldom or never happens that any difficulty occurs in this situation, in putting a stop to the blood after the pressure is removed from the veins; all that is commonly necessary for this purpose being a slip of adhesive plaster, without any bandage whatever.

In order to bring the vein more clearly into view, so as afterwards to be able to open it with more exactness, it has been recommended that the skin, cellular substance, and muscular fibres, covering the vein, should be previously divided with a scalpel before attempting to push the lancet into it. There is not, however, any necessity for this precaution, as it rarely happens that any difficulty is experienced in procuring a free discharge of blood by opening the vein and teguments at once in the manner directed. And it is here, as in every instance where it is necessary to take blood by a lancet, if it is not done at once, the patient is much disappointed, and is sure to attribute the failure entirely to a fault in the operator.

When blood is to be discharged from the veins of the *anale* or *feet*, the ligature being applied a little above the ankle-joint, all the branches of the *vena saphena*, both on the inside and outside of the foot, come at once into view; and as this vein lies every-where very superficial, being in general covered with skin only, wherever a proper vein appears conspicuously it may with safety be opened.

With a view to encourage the discharge of blood, it has been a constant practice in blood-letting, in these veins, to dip the feet into warm water immediately on the orifice being made. But this is a very inaccurate method of proceeding, as the quantity of blood taken in this manner can never be ascertained with precision; for the blood being all mixed with the water, the operator can never be in any degree certain as to this point: and besides, there does not appear to be any necessity for this assistance; for when the compression of the superior part of the veins is made effectual, and the orifice is of a proper size, there is seldom more difficulty in obtaining a full discharge of blood from the veins of these parts than from any other veins of the body.

On removing the ligature, the discharge is generally stopped at once; so that a piece of adhesive plaster applied over the orifice, answers all the purpose of a bandage. The arm, neck, and ankles, are parts from whence blood is usually taken by venesection; but on some occasions, where the contiguous parts have been particularly affected, it has been thought advisable to perform venesection in other places.

When venesection is to be performed in the veins called *ranula*, under the tongue, the apex of the tongue is to be elevated, and the vein on each side opened, because the opening of one will hardly ever discharge blood enough. After a sufficient quantity has been discharged, some cold astringent fluid taken into the mouth will generally stop the hemorrhage.

The *vena dorsalis penis*, which runs along the back or upper side of this member, being generally pretty much distended, and conspicuous in an inflammation of this part, may be opened about the middle or back-part of the penis; and a sufficient quantity of blood be discharged, proportionable to the urgency of the symptoms. This being done, apply a compress and bandage proper for the penis. The arteries and nerves which lie on each side of the vein are to be avoided: nor ought the bandage to be too tight, otherwise the inflammation and other symptoms may turn out worse than before.

When it is found necessary to discharge blood in this manner from the penis, the veins can be easily brought into view, by producing an accumulation of their contents in the same manner as in other parts of the body, through the intervention of a ligature: but in the tongue, in the hæmorrhoidal veins about the anus, and other parts where compression cannot be applied, all that the surgeon can do, is to make an orifice of a proper size in that part of the vein which

shews itself most evidently; and if a sufficient discharge of blood is not thus produced, as there is no other method of effecting it, immersing the parts in warm water may, in such circumstances, be a very necessary measure.

There are several ways of performing the operation of blood-letting in the *eyes*. We shall here only relate the chief: First, the patient is to be seated conveniently on the bed-side or on a chair, with his head held in a proper posture by an assistant; which done, the surgeon makes a transverse incision with a lancet upon the turgid small vessels in the corners of the eye, so as to open them or cut them quite across. Some use a small pair of scissors, instead of a lancet, to divide the vessels; but in using either of them, the eye-lids must be separated from each other by the fingers of one hand, while the vessels are cut by instruments held in the other. Some, again, elevate the small turgid vessels with a crooked needle before they divide them, the eye-lids being in the mean time held asunder by an assistant. The small vessels being thus opened or divided, their discharge of blood should be promoted by fomentations of warm water frequently applied to the eye by means of a sponge or soft linen rags.

Among other methods that have been proposed for scarifying the blood-vessels of the eye, the beards of rough barley were at one period much extolled, and are still employed by some individuals. By drawing them over the surface of the eye, in a direction contrary to the sharp spiculæ with which they are furnished, a considerable discharge of blood is thereby produced: but the pain attending this operation is exquisite; and as it does not possess any superior advantage to the method with the lancet, it is now falling into general disuse.

SECT. III. *Of* ARTERIOTOMY.

Whatever particular advantages may in theory have been expected from arteriotomy, and however some of its supporters may have recommended it, not only as being in many instances preferable to venesection, but as an operation perfectly safe even in vessels of considerable size, yet the most strenuous friends to the practice have shrunk from any real attempt of this kind on the larger arteries. Instances have no doubt occurred of large arteries having been opened without any danger ensuing; but these are so exceedingly rare, that no practitioner of experience will, from that consideration, be induced coolly to proceed to open any artery of importance. The smaller branches of arteries may indeed be opened with great safety, when they are not deeply covered, and especially when they lie contiguous to bones; but in any of the larger arteries, the attempt must be always attended with so much hazard, and the advantages

to be expected from it, in preference to venæsection, are apparently so trifling, as must in all probability prevent it from ever being carried into execution.

There are very few arteries, therefore, which with any propriety can be opened: the different branches of the temporal are the only arteries indeed from whence blood, in ordinary practice, is ever taken; for although the opening of some other branches of arteries has by some been proposed, yet they are situated in such a manner that they either cannot be readily come at, or being in the neighbourhood of large nerves, the opening of them might be attended with bad consequences. In performing this operation on any of the temporal branches, if the artery lies superficial, it may be done with one push of the lancet, in the same manner as was directed for venæsection; but when the artery lies deeply covered with cellular substance it is always necessary to lay it fairly open to view, before making the orifice with the lancet: for in all the smaller arteries, when they are cut entirely across, there is little chance of being able to procure any considerable quantity of blood from them; as, when divided in this manner, they are sure to retract considerably within the surrounding parts, which commonly puts a stop to all farther evacuation.

Some degree of nicety is also necessary in making the opening into the artery of a proper oblique direction, neither quite across nor directly longitudinal; for a longitudinal opening never bleeds so freely, either in an artery or in a vein, as when its direction is somewhat oblique.

If the opening has been properly made, and if the artery is of any tolerable size, it will at once discharge very freely without any compression; but when the evacuation does not go on so well as could be wished, the discharge may be always assisted by compressing the artery immediately above the orifice, between it and the corresponding veins. The quantity of blood being thus discharged, it will commonly happen, that a very slight compression on these smaller arteries will suffice for putting a stop to the evacuation; and whatever pressure is found necessary, may be here applied in the same manner as was directed in venæsection.

It happens, however, in some instances, that this does not succeed, the orifice continuing to burst out from time to time, so as to be productive of much distress and inconvenience.

In this situation there are three different methods by which we may with tolerable certainty put a stop to the farther discharge of blood. 1st. If the artery is small, as all the branches of the temporal arteries commonly are, the cutting it entirely across, exactly at the orifice made with the lancet, by allowing it to retract within the surrounding parts, generally puts an immediate stop to the discharge. 2d. When that is not consented to, we have it always in our power to secure the bleeding vessel with a ligature, as we would do an artery accidentally divided in any part of the body. And,

lastly, if neither of these methods is agreed to by the patient, we can, by means of a constant regular pressure, obliterate the cavity of the artery at the place where the operation has been performed, by producing the accretion of its sides. Different bandages have been contrived for compressing the temporal artery; but none of them answer the purpose so easily and so effectually as the one figured in Plate I. fig. 7. This method is more tedious; but to timid patients it generally proves more acceptable than either of the other two.

SECT. IV. *Of* TOPICAL BLEEDING.

When, either from the severity of a local fixed pain, or from any other cause, it is wished to evacuate blood directly from the small vessels of the part affected, instead of opening any of the larger arteries or veins, the following are the different modes proposed for effecting it, viz. by means of leeches; by slight scarifications with the shoulder or edge of a lancet; and, lastly, by means of a well-known instrument termed a *scarificator*; in which sixteen or twenty lancets are commonly placed, in such a manner, that, when the instrument is applied to the part affected, the whole number of lancets contained in it are, by means of a strong spring, pushed suddenly into it, to the depth at which the instrument has been previously regulated. This being done, as the smaller blood-vessels only by this operation are ever intended to be cut, and as these do not commonly discharge freely, some means or other become necessary for promoting the evacuation.

Various methods have been proposed for this purpose. *Glasses* fitted to the form of the affected parts, with a small hole in the bottom of each, were long ago contrived; and these being placed upon the scarified parts, a degree of suction was produced by a person's mouth sufficient for nearly exhausting the air contained in the glass: and this accordingly was a sure enough method of increasing the evacuation of blood to a certain extent. But as this was attended with a good deal of trouble, and besides did not on every occasion prove altogether effectual, an exhausting syringe was at last adapted to the glass: which did indeed answer as a very certain method of extracting the air contained in it; but the application of this instrument for any length of time is very troublesome, and it is difficult to preserve the syringe always air-tight.

The application of heat to the *cupping-glasses*, has been found to rarefy the air contained in them to a degree sufficient for producing a very considerable suction. And as the instrument in this simple form answers the purpose in view with very little trouble to the operator, and as it is at all times easily obtained, the use of the syringe has therefore been laid aside.

There are different methods adopted for thus applying heat to the cavity of the glass. By supporting the mouth of it for a few seconds above the flame of a taper, the air may be sufficiently rarefied; but if the flame is not kept exactly in the middle, but is allowed to touch either the sides or bottom of the glass, it is very apt to make it crack. A more certain, as well as an easier, method of applying the heat, is to dip a piece of soft bibulous paper in spirit of wine; and having set it on fire, to put it into the bottom of the glass, and, on its being nearly extinguished, to apply the mouth of the instrument directly upon the scarified part. This degree of heat, which may be always regulated by the size of the piece of paper, and which it is evident ought to be always in proportion to the size of the glass, if long enough applied, proves always sufficient for rarefying the air very effectually, and at the same time, if done with any manner of caution, never injures the glass in the least.

The glass having been thus applied, if the scarifications have been properly made, they instantly begin to discharge freely: and so soon as the instrument is nearly full of blood, it should be taken away; which may be always easily done by raising one side of it, so as to give access to the external air. When more blood is wished to be taken, the parts should be bathed with warm water; and being made perfectly dry, another glass, exactly the size of the former, should be instantly applied in the very same manner: and thus, if the scarificator has been made to push to a sufficient depth, so as to have cut all the cutaneous vessels of the part, almost any necessary quantity of blood may be obtained. It sometimes happens, however, that the full quantity intended to be discharged cannot be got at one place. In such a case, the scarificator must be again applied on a part as contiguous to the other as possible; and this being done, the application of the glasses must also be renewed as before.

When it is wished to discharge the quantity of blood as quickly as possible, two or more glasses may be applied at once on contiguous parts previously scarified; and, on some occasions, the quantity of blood is more quickly obtained by the cupping-glasses being applied for a few seconds, upon the parts to be afterwards scarified. The suction produced by the glasses may possibly have some influence in bringing the more deep-seated vessels into nearer contact with the skin, so that more of them will be cut by the scarificator.

A sufficient quantity of blood being procured, the wounds made by the different lancets should be all perfectly cleared of blood; and a bit of soft linen or charpie, dipped in a little milk or cream, applied over the whole, is the only dressing that is necessary. When dry linen is applied, it not only creates more uneasiness to the patient, but renders the wounds more apt to fester than when it has been previously wetted in the manner directed.

Dry cupping consists in the application of the cupping-glasses directly to the parts affected, without the use of the scarificator. By

this means a tumor is produced upon the part; and where any advantage is to be expected from a determination of blood to a particular spot, it may probably be more easily accomplished by this means than by any other.

When the part from which it is intended to produce a local evacuation of this kind is so situated, that a scarificator and cupping-glasses can be applied, this method is greatly preferable to every other; but in inflammatory affections of the eye, of the nose, and of other parts of the face, &c. the scarificator cannot be properly applied directly to the parts affected. In such instances, *leeches* are commonly had recourse to, as they can be placed upon almost any spot from whence we would wish to discharge blood.

In the application of these animals, the most effectual method of making them fix upon a particular spot, is to confine them to the part by means of a small wine-glass. Allowing them to creep upon a dry cloth, or upon a dry board, for a few minutes before application, makes them fix more readily; and moistening and cooling the parts on which they are intended to fix, either with milk, cream, or blood, tends also to make them adhere much more speedily than they otherwise would do. So soon as the leeches have separated, the ordinary method of promoting the discharge of blood, is to cover the part with linen cloths wet in warm water. In some situations, this may probably be as effectual a method as any other; but wherever the cupping-glasses can be applied over the wounds, they answer the purpose much more effectually.

CHAP. IX. OF ISSUES.

ISSUES are a kind of artificial ulcers formed in different parts of the body with a view to procure a discharge of purulent matter, which is frequently of advantage in different disorders.

Practitioners were formerly of opinion that *issues* served as drains to carry off the noxious humours from the blood, and therefore they placed them as near the affected part as possible. But as it is now known that they prove useful merely by the quantity of matter which they produce, they are generally placed where they will occasion the least inconvenience. The most proper parts for them are, the nape of the neck; the middle, outer, and fore part of the humerus; the hollow above the inner side of the knee; or either side of the spine of the back; or between two of the ribs; or wherever there is a sufficiency of cellular substance for the protection of the parts beneath: they ought never to be placed over the belly of a muscle; nor over a tendon, or thinly covered bone; nor near any large blood-vessel.

The issues commonly used are, the blister-issue, the pea-issue, and the seton or cord.

When a *blister-issuë* is to be used, after the blister is removed, a discharge of matter may be kept up by dressing the part daily with an ointment mixed with the powder of cantharides. If the discharge be too little, more of the powder may be used; if too great, or if the part be much inflamed, the issuë ointment may be laid aside, and the part dressed with basilicon, or with common cerate, till the discharge be diminished and the inflammation abated. It is most proper sometimes to use the issuë ointment and a mild one alternately.

A *pea-issuë* is formed either by making an incision with a lancet, or by caustic, large enough to admit one or more peas; though sometimes, instead of peas, kidney-beans, Gentian root, or orange-peas, are used. When the opening is made by an incision, the skin should be pinched up and cut through, of a size sufficient to receive the substance to be put into it. But when it is to be done by caustic, the common caustic, or lime and kali of the shops, answers best: it ought to be reduced to a paste with a little water or soft soap, to prevent it from spreading; an adhesive plaster, with a small hole cut in the centre of it, should be previously placed, and the caustic paste spread upon the hole in the centre. Over the whole, an adhesive plaster should be placed to prevent any caustic from escaping. In ten or twelve hours the whole may be removed, and in three or four days the eschar will separate, when the opening may be filled with peas, or any of the other substances already mentioned.

The *seton* is used where a large quantity of matter is wanted, and especially where it is wished for from deep-seated parts. It is frequently used in the back of the neck for diseases of the head or eyes, or between two of the ribs in affections of the breast.

When the *cord*, which is to be made of threads of cotton or silk, is to be introduced, the parts at which it is to enter and pass out should be previously marked with ink, and a small part of the cord being besmeared with some mild ointment, and passed through the eye of the seton-needle, Plate I. fig. 8. the part is to be supported by an assistant, and the needle passed fairly through, leaving a few inches of the cord hanging out. The needle is now to be removed and the part dressed. By this method matter is produced in quantity proportioned to the degree of irritation applied: and this can be increased or diminished by covering the cord daily, before it is drawn, with an irritating or mild ointment.

CHAP. X. OF SUTURES AND LIGATURES OF ARTERIES.

SECT. I. Of SUTURES.

THE intention of *sutures* is to unite parts which have been divided, and where the retraction of the lips of the wound has been considerable. The sutures in ordinary use at present, among sur-

geons, are the interrupted, the quilled, and the twisted. Besides these futures, adhesive plasters are used for uniting the lips of wounds, which have been termed the *false* or *dry* future, in opposition to the others which have obtained the name of *true* or *moist*. The true future is used in cases of deep wounds, while the false is employed in those of a superficial nature.

The interrupted future is made as follows. The wound being emptied of the grumous blood, and the assistant taking care that the lips of it lie quite even, the surgeon is carefully to carry the needles from the bottom outwards; using the caution of making them come out far enough from the edge of the wound, which will not only facilitate the passing of the ligature, but will also prevent it from cutting through the skin and flesh; as many more stitches as may be required will be only repetitions of the same process. The threads being all passed, let those be first tied which are in the middle of the wound: though, if the lips are held carefully together all the while, as they should be, it will be of no great consequence which is done first. The most useful kind of knot is a single one first, and then a slip-knot, which may be loosened upon any considerable inflammation taking place. If a violent inflammation should succeed, loosening the ligature only will not suffice; it must be cut through and drawn away, and the wound be treated afterwards without any future. When the wound is small, the less it is disturbed by dressing the better; but in large ones, there will sometimes be a considerable discharge; and if the threads be not cautiously carried through the bottom of it, abscesses will frequently ensue from the matter being pent up underneath, and not finding issue. If no accident happen, after the lips are firmly agglutinated, the ligatures are to be removed, and the orifices which they leave dressed.

It will readily be understood, that the strength of the ligature and size of the needle ought always to be proportionable to the depth of the sore and retraction of the parts. The crooked needles used in such cases are known to every one.

It must likewise be remembered, that during the cure the future must be always assisted by the application of bandage, if possible, which is frequently of the greatest importance; and that sort of bandage with two heads, and a slit in the middle, which is by much the best, will in most cases be found practicable.

In deep wounds, attended with much retraction, it is always a necessary precaution to assist the operation of the ligatures by means of bandages, so applied as to afford as much support as possible to the divided parts: but even with every assistance of this nature, it now and then happens, that the divided parts cannot be kept together, retraction occurs to a greater or lesser degree, and the ligatures of course cut asunder the soft parts they were at first made to retain.

With a view to prevent this receding of the teguments and other parts, it was long ago proposed to add to the interrupted future what

was supposed would afford an additional support, viz. quills, or pieces of plaster rolled up into the form of quills; one of which being placed on each side of the wound, the double of the ligature is made to include the one, and the knot to press directly upon the other, instead of being made immediately on the edges of the sore, as was directed for interrupted futures.

It is at once evident, however, that the ligatures must here make the same degree of pressure on the parts through which they pass as they do in the interrupted future; and this being the case, it is equally obvious, that the interposition of these substances cannot be of any use. This future is accordingly now very rarely practised by surgeons.

By the term *twisted future*, is meant that species of ligature by which parts, either naturally or artificially separated, are united together by means of strong threads properly twisted round pins or needles pushed through the edges of the divided parts.

The future is commonly employed for the purpose of uniting the parts in cases of *hare-lip*; and this indeed is almost the only use to which it has been hitherto applied: but it may with great advantage be put in practice in a variety of other cases, particularly in all artificial or accidental divisions either of the lips or cheeks; and in every wound in other parts that does not run deep, and in which futures are necessary, this future is preferable to the interrupted or any other. The pins made use of for twisting the threads upon ought to be made of a flat form, so as not to cut the parts through which they pass so readily as the ligatures employed in the interrupted future. And thus one great objection to the latter is very effectually obviated: for every practitioner must be sensible of this being the most faulty part of the interrupted future, that when muscular parts are divided so as to produce much retraction, the ligatures employed for retaining them almost constantly cut them through before a reunion is accomplished; whereas the flatness of the pins used in the twisted future, and upon which the whole pressure produced by the ligatures is made to rest, proves in general a very effectual preventive against all such occurrences.

The pins used in this operation are represented in Plate I. fig. 9. They are commonly made of gold or silver; and in order to make them pass with greater ease, steel points are added to them. They are sometimes used, however, of gold or silver alone.

The manner of performing this operation is as follows. The divided parts intended to be reunited, must, by the hands of an assistant, be brought nearly into contact; leaving just as much space between the edges of the sore as to allow the surgeon to see that the pins are carried to a proper depth. This being done, one of the pins must be introduced through both sides of the wound, by entering it on one side externally, pushing it forwards and inwards to within a little of the bottom of the wound, and afterwards carrying it out-

wardly through the opposite side, to the same distance from the edge of the fore that it was made to enter at on the other.

The distance at which the needle ought to enter from the edge of the fore must be determined by the depth of the wound, and by the degree of retraction produced in the divided parts. In general, however, it is a proper regulation, in deep wounds, to carry the pins nearly to the same distance from the side of the fore as they are made to penetrate in depth : and whatever the deepness of the wound may be, the pins ought to pass within a very little of its bottom : otherwise the parts which lie deep, will run a risk of not being united ; a circumstance which must always give rise to troublesome collections of matter.

The first pin being passed in this manner very near to one end of the fore, and the parts being still supported by an assistant, the surgeon, by means of a firm waxed ligature, passed three or four times round and across the pin, so as nearly to describe the figure of 8, is to draw the parts through which it has passed into immediate and close contact : and the thread being now secured with a loose knot, another pin must be introduced in the same manner at a proper distance from the former ; and the thread with which the other was fixed being loosed, and in the same manner carried round this pin, others must be introduced at proper distances along the whole course of the wound ; and the same ligature ought to be of a sufficient length for securing the whole.

The number of pins to be used must be determined entirely by the extent of the wound. Whenever this suture is practised, a pin ought to be introduced very near each end of the wound, otherwise the extremities of the fore are apt to separate so as not to be afterwards easily reunited. In large wounds, if the pins are introduced at the distance of three quarters of an inch from one another, it will in general be found sufficient ; but in cuts of smaller extent a greater number of pins becomes necessary in proportion to the dimensions of the fores.

Thus in a wound of an inch and a half in length, three pins are absolutely requisite ; one near to each end, and another in the middle of the fore : whereas five pins will always be found fully sufficient for a wound of three inches and a half in extent, allowing one to be within a quarter of an inch of each extremity of the wound, and the others to be placed along the course of the fore at the distance of three quarters of an inch from one another.

The pins being all introduced and secured in the manner directed, nothing remains to be done, but to apply a piece of lint wet with mucilage all along the course of the wound, with a view to exclude, as effectually as possible, every access to the external air.

When the pins remain long, they generally do harm, by the unnecessary irritation and consequent retraction of parts with which they are always attended ; and if they are not continued for a sufficient

length of time, that degree of adhesion is not produced between the divided parts which is necessary for their future retention; so that the effect of the operation comes to be in a great measure, if not entirely, lost.

In wounds of no great depth, for instance of three quarters of an inch or so, a sufficient degree of adhesion always takes place in the space of five days: and six, or at most seven days, will generally be found sufficient for wounds of the greatest depth. But with respect to this circumstance, it must always be understood, that the patient's state of health must have a considerable influence on the time necessary for producing adhesion between divided parts.

When the pins are withdrawn, the uniting bandage may be applied with great advantage; but as slips of leather spread with ordinary glue, when applied to each side of the cicatrix, may, by means of ligatures properly connected with them, be made to answer the purpose more effectually, this mode of supporting the parts ought of course to be preferred.

SECT. II. *Of the* LIGATURE of ARTERIES.

When a surgeon is called immediately to a wound of any great artery of a limb, he should clap the point of his finger upon the wounded artery, or make his assistant hold it; cut the wound so far open as to see the artery fairly; draw it out if it be cut across, and have shrunk among the flesh; or tie it like the artery of the arm in aneurism by passing ligatures under it. When, however, the wound happens in such situations that we cannot command the blood, it is better to close the lips of the wound, and try to make them adhere by means of a very steady compress and bandage. Thus an aneurism will form; the operation for the cure of which shall be presently described.

When accidents of this nature occur in any of the extremities, and where pressure can be made with ease on the superior part of the artery, we are possessed of an instrument which never fails to put a stop to all further loss of blood: we mean the tourniquet. See Plate I. fig. 10.

The *tourniquet* has undergone many improvements; but the one here represented is considered as the best. By means of it the blood in any limb is very easily and effectually commanded; and as it grasps the whole member equally, all the collateral branches, as well as the principal arteries, are equally compressed by it. It has this material advantage too over every other instrument of this kind, that when properly applied a single turn, or even half a turn, of the screw, is sufficient for producing either a flow of blood, or for putting a total stop to it.

The *manner of* using it is as follows. Let a cushion of three inches in length by one inch and half in diameter be prepared of a linen roller, tolerably firm, but not so hard as to render pressure produced by it very painful. This being placed upon the course of the principal artery of the limb, is to be firmly secured in that situation by one or two turns of a circular roller, of the same breadth with the cushion itself.

The instrument, with the strap connected with it, being now placed upon the limb, with the handle of the screw on the opposite side of the member to the cushion upon the artery, the strap is to be carried round the limb directly over the cushion, and to be firmly connected on the other side of the buckle. In thus connecting the strap and buckle together, particular attention is necessary in doing it with great firmness, so as that the screw may afterwards operate with as much advantage as possible in producing a sufficient degree of pressure. When proper attention is paid to this circumstance, a single turn of the screw proves sufficient for putting an entire stop to the circulation of blood in the limb: but when the strap has not originally been made very tight, several turns of the screw become necessary; an occurrence which may be always very easily prevented, and which, when not attended to, frequently proves very embarrassing in the course of an operation.

Various methods have been invented for securing arteries by means of ligatures. The practice till lately in ordinary use was, by means of a curved needle, to pass a ligature of sufficient strength round the mouth of the bleeding vessel, including a quarter of an inch all round the surrounding parts, and afterwards to form a knot of a proper tightness upon the vessel and other parts comprehended in the noose. But this method was found to give so much pain, and in some cases to be attended with such violent convulsions, not only in the part chiefly affected, but of the whole body, that the best practitioners have thought proper to reject it, and to tie up the blood-vessels by themselves: for it is now well known that even very small arteries are possessed of much firmness; and that even in the largest arteries a slight degree of compression is sufficient not only for restraining hæmorrhagy, but for securing the ligature on the very spot to which it is first applied.

In order to detect the arteries to be tied, the tourniquet, with which they are secured, must be slackened a little by a turn or two of the screw; and the moment the largest artery of the fore is discovered, the surgeon fixes his eye upon it, and immediately restrains the blood again by means of the tourniquet. An assistant now forms a noose on the ligature to be made use of; and this noose being put over the point of the tenaculum, Plate I. fig. 11. the operator pushes the sharp point of the instrument through the sides of the vessel, and at the same time pulls so much of it out, over the surface of the surrounding parts, as he thinks is sufficient to be included in the knot

which the assistant is now to make upon the artery. In forming this ligature a single knot moderately drawn, and over it another single knot, is perfectly sufficient.

When from the deepness of a wound, or from any other cause, some particular artery cannot be properly secured by the tenaculum; in this case there is a necessity of employing the crooked needle, and the following is the method of using it.

A needle of the common bent shape, armed with a ligature of a size proportioned to itself and to the vessel to be taken up, is to be introduced at the distance of a sixth or eighth part of an inch from the artery, and pushed to a depth sufficient for retaining it, at the same time that it is carried fully one half round the blood-vessel. It must now be drawn out; and being again pushed forward till it has completely encircled the mouth of the artery, it is then to be pulled out, and a knot to be tied of a sufficient firmness, as already directed when the tenaculum is used.

CHAP. XI. OF ANEURISMS.

THE term *aneurism* was originally meant to signify a tumor formed by the dilatation of the coats of an artery; but by modern practitioners it is made to apply not only to tumors of this kind, but to such as are formed by blood effused from arteries into the contiguous parts. There are three species; the true or encysted, the false or diffused, and the varicose aneurism.

The *true* or *encysted aneurism*, when situated near the surface of the body, produces a tumor at first small and circumscribed; the skin retains its natural appearance; when pressed by the fingers, a pulsation is evidently distinguished; and with very little force the contents of the swelling may be made to disappear; but they immediately return upon removing the pressure. By degrees the swelling increases, and becomes more prominent; but still the patient does not complain of pain: on pressure the tumor continues of an equal softness, and is compressible. After this the swelling becomes large, the skin turns paler than usual, and in more advanced stages oedematous: the pulse still continues; but parts of the tumor become firm from the coagulation of the contained blood, and yield little to pressure: at last the swelling increases in a gradual manner, and is attended with a great degree of pain. The skin turns livid, and has a gangrenous appearance. An oozing of bloody serum occurs from the integuments; and, if a real mortification do not take place, the skin cracks in different parts; and the artery being now deprived of the usual resistance, the blood bursts out with such force as to occasion the almost immediate death of the patient. Thus the disease terminates in the large cavities of the body; but in the extremities

we can, by means of the tourniquet, prevent the sudden termination of the disease.

When affections of this kind happen in the larger arteries, the effects produced upon the neighbouring parts are often surprising: the soft parts not only yield to a great extent, but even the bones frequently undergo a great degree of derangement.

The *false or diffused aneurism* consists in a wound or rupture in an artery, producing, by the blood thrown out of it, a swelling in the contiguous parts. It is most frequently produced by a wound made directly into the artery.

The following is the usual progress of the disorder. A tumor, about the size of a horse-bean, generally rises at the orifice in the artery soon after the discharge of the blood has been stopped by compression. At first it is soft, has a strong degree of pulsation, and yields a little to pressure, but cannot be made entirely to disappear; for here the blood forming the tumor being at rest begins to coagulate. If not improperly treated by much pressure, it generally remains nearly of the same size for several weeks. The enlargement however proceeds more rapidly in some cases than in others. Instances have occurred of the blood being diffused over the whole arm in the space of a few hours; while, on the contrary, swellings of this kind have been many months, nay even years, in arriving at any considerable size.

As the tumor becomes larger it does not, like the true aneurism, grow much more prominent, but rather spreads and diffuses itself into the surrounding parts. By degrees it acquires a firm consistence; and the pulsation, which was at first considerable, gradually diminishes till it is sometimes scarcely perceptible. If the blood at first thrown out proceed from an artery deeply seated, the skin preserves its natural appearance till the disorder is far advanced: but when the blood gets at first into contact with the skin, the parts become instantly livid, indicating the approach of mortification; and a real phacelus has sometimes been induced. The tumor at first produces little uneasiness; but as it increases in size, the patient complains of severe pain, stiffness, numbness, and immobility of the whole joint; and these symptoms continuing to augment, if the artery be large, and assistance not given, the teguments at last burst, and death must ensue.

When an artery is punctured through a vein, as in blood-letting at the arm, the blood generally rushes into the yielding cellular substance, and there spreads so as to shut the sides of the vein together. But in some instances where the artery happens to be in contact with the vein, the communication opened has been preserved; and the vein not being sufficiently strong for resisting the impulse of the artery, must consequently be dilated. This is a *varicose aneurism*. It was first accurately described by Dr. Hunter, and since that time

has been frequently observed by different practitioners. Here the swelling is entirely confined to the veins. Soon after the injury the vein immediately communicating with the artery begins to swell, and enlarge gradually. If there be any considerable communications in the neighbourhood, the veins which form them are also enlarged. The tumor disappears upon pressure, the blood contained in it being chiefly pushed forwards in its course towards the heart; and when the tumor is large, there is a singular tremulous motion, attended with a perpetual hissing noise, as if air was passing into it through a small aperture.

If a ligature be applied upon the limb, immediately below the swelling, tight enough to stop the pulse in the under part of the member, the swelling disappears by pressure, but returns immediately upon the pressure being removed. If after the swelling is removed by pressure, the finger be placed upon the orifice in the artery, the veins remain perfectly flaccid till the pressure is taken off. If the trunk of the artery be compressed above the orifice so as effectually to stop the circulation, the tremulous motion and hissing immediately cease; and if the veins be now emptied by pressure, they remain so till the compression upon the artery be removed. If the vein be compressed a little above as well as below the tumor, all the blood may generally, though not always, be pushed through the orifice into the artery; from whence it immediately returns on the pressure being discontinued.

When the disease has continued long, and the dilatation of the veins has become considerable, the trunk of the artery above the orifice generally becomes greatly enlarged, while that below becomes proportionably small; of consequence the pulse in the under part of the member is always more feeble than in the sound limb of the opposite side.

The *causes producing aneurisms*, in general, are a natural disease of the arteries. Thus a partial debility of their coats may readily produce the disease; or they may arise, especially in the internal parts of the body, from great bodily exertions. They are likewise produced by wounds of the coats of the arteries, as now and then happens in blood-letting at the arm; or from acrid matter contained in a neighbouring sore; or from the destruction of surrounding parts, by which the natural support is removed.

Aneurisms have frequently been mistaken for abscesses and other collections of matter, and have been laid open by incision; on which account great attention is sometimes required to make the proper distinction. In the commencement of the disease, the pulsation in the tumor is commonly so strong, and other concomitant circumstances so evidently point out the nature of the disorder, that little or no doubt respecting it can ever take place; but in the more advanced stages of the disease, when the swelling has become large and has lost its pulsation, nothing but a minute attention to the previous

history of the case can enable the practitioner to form a judgment of its nature.

Aneurisms may be confounded with soft encysted tumors, serophulous swellings, and abscesses situated so near to an artery as to be affected by its pulsation. But one symptom, when connected with strong pulsation, may always lead to a certain determination that the swelling is of the aneurismal kind, viz. the contents of the tumor being made easily to disappear upon pressure, and their returning on the compressure being removed. The want of this circumstance, however, ought not to convince us that it is not of that nature; for it frequently happens, especially in the advanced stages of aneurisms, that their contents become so firm that no effect is produced upon them by pressure. Hence the propriety, in doubtful cases, of proceeding as if the disease was clearly of the aneurismal kind.

In the *prognosis*, three circumstances are chiefly to be attended to; the manner in which the disease appears to have been produced, the part of the body in which the swelling is situated, and the age and habit of body of the patient.

If an aneurism has come forward in a gradual manner, without any apparent injury done to the part, and not succeeding any violent bodily exertion, there will be reason to suppose that the disease depends upon a general affection either of the trunk in which it occurs, or of the whole arterial system. In such cases art can give little assistance: whereas if the tumor has succeeded an external accident, an operation may be attended with success.

In the *varicose aneurism* a more favourable prognosis may generally be given than in either of the other two species. It does not proceed so rapidly; when it has arrived at a certain length, it does not afterwards acquire much additional size; and it may be sustained without much inconvenience for a great number of years. As long as there is reason to expect this, the hazard which almost always attends the operation ought to be avoided.

In the second volume of the London Medical Observations, two cases are related by Dr. Hunter of the varicose aneurism. One of them at that time was of fourteen years' standing, and the other had subsisted for five years, without there being any necessity for an operation. And in vol. iii. of the same work, a similar case of five years' duration is related by Dr. Cleghorn.

In a letter, afterwards, from Dr. Hunter to Mr. Benjamin Bell, the doctor says, "The lady in whom I first observed the varicose aneurism is now living at Bath, in good health, and the arm is in no sense worse, although it is now thirty-five years since she received the injury:" and the doctor farther observes, that he never heard of the operation being performed for the varicose aneurism when known to be such.

Mr. Bell says, he was informed by Dr. William Cleghorn, of Dublin, that the case of varicose aneurism, related in the third vo-

lume of the London Medical Observations, remained nearly in the same state as at the time that account was made out, which included a period of at least twenty years; only that the veins were rather more enlarged. The patient recovered, and the limb became nearly as strong and serviceable as the other. Mr. Pott also met with three different instances of this species of aneurism; and observes, that the operation never became necessary in any of them.

Among other instances of varicose aneurism which have appeared here, a young man from Paisly was examined, several years ago, by different surgeons of this place. The disease was very clearly marked, and no operation was advised. He was afterwards found serving in the navy, where he underwent great fatigue without any inconvenience from the aneurism, though then of thirteen years' standing.

But though this aneurism, when it has arrived at a certain size, commonly remains stationary, and may be borne without much inconvenience for a long time, this is not always the case; for some instances have occurred where the disease was attended with great uneasiness, and where the operation was performed with much difficulty.

In judging further of the probable event of aneurisms in general, the situation of the tumor next requires attention. When it is so situated that no ligature or effectual compression can be applied for stopping the circulation in the part, if the artery be large, there would be the greatest danger in opening it. In this case, therefore, the most fatal consequences are to be apprehended.

When aneurisms are situated near the upper parts of the extremities, surgeons have been hitherto doubtful whether, after tying up the humeral or femoral arteries, the lower parts of the limb would be supplied with blood; and though several successful instances of performing that operation have been published, the success has been pretty generally ascribed to unusual branching of the great arteries of those patients, on whom the operation was performed above the aneurism. Mr. John Bell, however, in his late very ingenious and important Discourses on Wounds, has proved, to our satisfaction at least, that the anastomoses which take place between the internal iliac and the arteries of the leg, by means of the glutæal arteries and the profunda femoris, are in every case sufficient to supply nourishment to the limb; that the same is the case in the arm; and that therefore in every aneurism, even of the humeral or femoral artery, we ought to perform the operation. Several instances of success are there related; among others, an operation performed by Mr. J. Bell himself, which, as it is perhaps the greatest that has hitherto been performed, we shall here abridge for the gratification of our readers. A leech-catcher fell as he was stepping out of a boat; and a pair of long-pointed scissors pierced his hip, exactly over the sciatic notch, where the great iliac artery comes out from the pelvis. The artery bled furiously; the patient

fainted. The surgeon easily stopped up the wound, as it was very narrow and deep, and healed it. A great tumor soon formed. The man travelled from the north country in six weeks to the Edinburgh infirmary, with a prodigious tumor of the hip, the thigh rigidly contracted, the ham bent, the whole leg shrunk, and cold and useless. There was no pulsation nor retrocession of blood on pressure; but the distension was attended with great pain, and the man was extremely anxious to have an operation performed. Though there was little doubt of its being aneurism, it might be a great abscess. It was resolved, therefore, to make a small incision, and just touch the bag with the point of a lancet, and if it contained blood, a full consultation was to be called. Mr. Bell accordingly made an incision two inches and a half in length; the great fascia formed the coat of the tumor, and under it were seen the fibres of the great glutæus muscle. As soon as it was opened at one point great clots of blood came out; and Mr. Bell, after being certain that it was an aneurism of the great artery of the thigh, closed up the wound with a tent-like compress, put the patient to bed, and a pupil held his hand on the hip. This was done at one o'clock; at four the consultation met, and the operation was performed. On making an incision eight inches long, the blood was thrown out with a wishing noise, and with such impetuosity that the assistants were covered with it. In a moment twenty hands were about the tumor, and the bag was filled with sponges and cloths of all kinds; the blood, however, still made its way; and the man, who had supported himself on his elbow, fell down; his arms and head hung down, he uttered two or three heavy groans, and they thought him dead. At that critical moment Mr. Bell ran the bistoury upwards and downwards; and at once made the wound two feet long; thrust his hand to the bottom of the tumor, felt the warm jet of blood, put his finger on the mouth of the artery, the pulse of which he felt distinctly; which first assured him that the man was alive. The artery was then tied, and when Mr. Bell lifted up his finger it was discovered to be the posterior iliac; that it had been cut fairly across, and had bled with open mouth. The patient was so low, that after dressing the wound they were obliged to bring in a bed, and leave him to sleep in the operation room. He was cured of this great wound in less than seven months, and afterwards recovered the use of his leg completely.

In every case of aneurism, the use of *pressure* has been indiscriminately recommended, not only in the incipient period of the disease, but even in its more advanced stages.

In the *diffused* or *false aneurism*, as pressure cannot be applied to the artery alone, without at the same time affecting the reflux veins; and as this, by producing an increased resistance to the arterial pulsations, must force an additional quantity of blood to the orifice in the artery; no advantage is to be expected from it, though it may be productive of mischief.

In the early stages of *encysted aneurism*, while the blood can be yet pressed entirely out of the sac into the artery, it often happens, by the use of a bandage of soft and somewhat elastic materials, properly fitted to the part, that much may be done in preventing the swelling from receiving any degree of increase; and on some occasions, by the continued support thus given to the weakened artery, complete cures have been at last obtained. In all such cases, therefore, particularly in every instance of the varicose aneurism, much advantage may be expected from moderate pressure.

But pressure, even in *encysted aneurism*, ought never to be carried to any great length; for tight bandages, by producing an immoderate degree of reaction in the containing parts to which they are applied, instead of answering the purpose for which they were intended, have evidently the contrary effect. Indeed the greatest length to which pressure in such cases ought to go, should be to serve as an easy support to the parts affected, and no farther.

In performing the operation for aneurism, the first step ought to be to obtain a full command of the circulation in the inferior part of the member by means of the tourniquet. This being done, the patient should be so placed that the diseased limb, on being stretched on a table, is found to be of a proper height for the surgeon; who, as the operation is generally tedious, ought to be seated. The limb being properly secured by an assistant, the operator is now, with the common scalpel, to make an incision through the skin and cellular substance along the whole course of the tumor; and as freedom in the remaining parts of the operation is here a matter of much importance, it is even of use to carry this external incision half an inch, or so both above and below the farthest extremities of the swelling.

All the effused blood ought then to be wiped off by means of a sponge; and the softest part of the tumor being discovered, an opening ought there to be made into it with a lancet, large enough for admitting a finger of the operator's left hand. This being done, and the finger introduced into the cavity of the tumor, it is now to be laid open from one extremity to the other, by running a blunt-pointed bistoury (Plate I. fig. 12.) along the finger, from below upwards, and afterwards from above downwards, so as to lay the whole cavity fairly open.

The cavity of the tumor being thus laid freely open, all the coagulated blood is to be taken out by the fingers of the operator, together with a number of tough membranous filaments commonly found there. The cavity of the tumor is now to be rendered quite dry, and free from the blood which, on the first opening of the swelling, is discharged into it from the veins in the inferior part of the member: the tourniquet is then to be slackened, to discover, not only the artery itself, but the opening into it, from whence the blood collected in the tumor has been all along discharged. This being done, the next point to be determined is the manner of securing this

opening into the artery, so as to prevent in future any further effusion of blood. Various means have been proposed for accomplishing this; but the effects of all of them may be comprehended under the three following heads:

1. The effects of ligature upon a large artery having on some occasions proved fatal to the inferior part of the member, it was long ago proposed, that so soon as the opening into the artery has been discovered, instead of applying a ligature round it, which for certain is to obliterate its cavity entirely, a piece of agaric, vitriol, alum, or any other *astringent* substance, should be applied to the orifice, in order, if possible, to produce a reünion of its sides.

2. Upon the same principle with the preceding, viz. that of still preserving the circulation in the artery, it was several years ago proposed by an eminent surgeon of Newcastle, Mr. Lambert, that the orifice in the artery should be secured by means of the *twisted suture*. A small needle being pushed through the edges of the wound, they are then directed to be drawn together by a thread properly twisted round the needle, as was formerly directed when treating of sutures.

Strong objections, however, occur to both of these methods. In the first place, no astringent application with which we are acquainted is possessed of such powers as to deserve much confidence. In almost every instance in which they have been used, the hæmorrhagy has recurred again and again, so as to prove very distressing, not only to the patient, but to the practitioner in attendance; little or no attention is therefore to be paid to remedies of this kind in ordinary practice.

Mr. Lambert's method of stitching the orifice in the artery is certainly a very ingenious proposal; and would, in all probability, at least in most instances, prove an effectual stop to all further discharge of blood: but as we have yet only one instance of its success, little can be said about it. Two material objections, however, seem to occur to this practice. One is, that in the operation for the aneurism, in almost every instance, a very few only excepted, the artery lies at the back-part of the tumor; so that when all the collected blood is removed, there is such a depth of wound that it must be always a very difficult matter, and on many occasions quite impracticable, to perform this nice operation upon the artery with that attention and exactness which, in order to ensure success, it certainly requires. But there is another very material objection. By introducing a needle through the sides of the orifice, and drawing these together by a ligature, the cavity of the artery must undoubtedly be at that point much diminished. Indeed Mr. Lambert, in his account of the case in which this operation was performed, acknowledges that the diameter of the artery was thereby diminished. Now the passage of the blood being thus contracted at one point, the impulse upon that particular part must be very considerable: so that

the very remedy employed for the cure of one species of aneurism will, in all probability, prove a very powerful agent in inducing another; for the blood being thus obstructed in its usual course, there will be no small danger incurred of a dilatation being produced immediately above this preternatural stricture.

3. Neither of the methods we have yet been considering being found eligible for securing the orifice in the artery, we shall now proceed to describe *the ordinary manner of performing this operation*; which consists in obliterating the arterial cavity entirely by means of ligatures.

The artery being laid bare, in the manner directed, and all the coagulated blood being carefully removed from the cavity of the tumor, on the tourniquet being now slackened so as to bring the orifice in the artery into view, a small probe, curved at the extremity, is to be introduced at the opening, in order to raise the artery from the neighbouring parts, so as that the surgeon may be enabled with certainty to pass a ligature round it, without comprehending the contiguous nerves, which in general run very near to the large blood-vessels of a limb. By this precaution the nerves may be always avoided; and by doing so, a great deal of mischief may be prevented, which otherwise might supervene. When the disorder is situated either in the ham, or in the usual part of blood-letting in the arm, bending the joints of the knee, or of the elbow, as it relaxes the artery a little, renders this part of the operation more easily effected than when the limbs are kept fully stretched out.

The artery being thus gently separated from the contiguous parts, a firm waxed ligature must be passed round it, about the eighth part of an inch or so above the orifice, and another must in the same manner be introduced at the same distance below it.

The ligatures being both finished in the manner directed, the tourniquet is now to be made quite loose; and if no blood is discharged at the orifice in the artery, we may then rest satisfied that the operation is so far properly completed.

The wound is now to be lightly covered with soft lint, with a pledget of any emollient ointment over the whole; and a compress of linen being applied over the dressings, all the bandage in any degree requisite is two or three turns of a roller above, and as many below the centre of the wound, making it press with no more tightness than is absolutely necessary for retaining the application we have just now mentioned.

The patient being now put into bed, the member should be laid in a relaxed posture upon a pillow, and ought to be so placed as to create the least possible uneasiness from the posture in which it is laid.

As the operation for the aneurism is always tedious, and produces much pain and irritation, a full dose of laudanum should be given immediately on the patient being got into bed. In order to diminish

sensibility during some of the more capital operations, different trials have been made of opiates given an hour or so before the operation. On some occasions this proved evidently very useful; but in others it seemed to have the contrary effect; particularly in weak nervous constitutions, in which with any doses, however small, they appeared to be rendered more irritable and more susceptible of pain than if no opiate had been given. Immediately after this operation, however, an opiate ought to be exhibited, to be repeated occasionally according to the degrees of pain and restlessness.

In some few cases of aneurism it has happened that the pulse in the under part of the member has been discovered immediately after the operation. This, however, is a very rare occurrence: for as this disorder is seldom met with in any other part than at the joint of the elbow as a consequence of blood-letting, and as it rarely happens that the brachial artery divides till it passes an inch or two below that place, the trunk of this artery is therefore most frequently wounded; and when, accordingly, the ligature, in this operation, is made to obliterate the passage of almost the whole blood which went to the under part of the arm, there cannot be the least reason to expect any pulsation at the wrist, till in a gradual manner the anastomosing branches of the artery have become so much enlarged as to transmit such a quantity of blood to the inferior part of the member as is sufficient for acting as a stimulus to the larger branches of the artery.

Immediately after the operation, the patient complains of an unusual numbness or want of feeling in the whole member; and as it generally, for a few hours, becomes cold, it is therefore right to keep it properly covered with warm soft flannel; and in order to serve as a gentle stimulus to the parts below, moderate frictions appear to be of use. In the space of ten or twelve hours from the operation, although the numbness still continues, the heat of the parts generally begins to return; and it frequently happens, in the course of a few hours more, that all the inferior part of the member becomes even preternaturally warm.

Immediately after this operation the want of feeling in the parts is often very great; and in proportion as the circulation in the under part of the member becomes more considerable, the degree of feeling also augments. If we could suppose the nerves of the parts below to be always included in the ligature with the artery, that numbness which succeeds immediately to the operation might be easily accounted for; but it has been also known to happen when nothing but the artery was secured by the ligature.

In the mean time, the patient being properly attended to as to regimen, by giving him cordials and nourishing diet when low and reduced, and confining him to a low diet if his constitution is plethoric, the limb being still kept in an easy relaxed posture, towards the end of the fourth or fifth day, sometimes much sooner, a very

weak feeble pulse is discovered in the under part of the member, which becoming stronger in a gradual manner, the patient in the same proportion recovers the use and feeling of the parts.

So soon as there is an appearance of matter having formed freely about the sore, which will seldom happen before the fifth or sixth day, an emollient poultice should be applied over it for a few hours, in order to soften the dressings, which may be then removed. At this time the ligatures might be taken away; but as their continuance for a day, or two longer can do no harm, it is better to allow them to remain till the second or third dressing, when they either drop off themselves, or may be taken away with perfect safety. The dressings, which should always be of the softest materials, being renewed every second or third day according to the quantity of matter produced, the sore is in general found to heal very easily; and although the patient may for a considerable time complain of great numbness and want of strength in the whole course of the diseased limb, yet in most instances a very free use of it is at last obtained.

Very often after the artery seems to be secured it gives way, and fatal hemorrhagies ensue; nor is the patient free from this danger for a great length of time. In one of the late Mr. Hunter's operations the artery gave way on the 26th day. It is to this difficulty of procuring adhesion between the sides of the artery, which may frequently be diseased to *some distance above the ligature*, that a great part of the danger of this operation is to be ascribed.

The ingenious practitioner, whose name has just now occurred, urged by the ill success attending the common means of treating aneurism, suggested a mode of operating which underwent many trials in the London and Edinburgh hospitals, and of which the following account was published by Mr. Home, in the Transactions of the London Society for the improvement of Medicine and Surgery.

The aneurism of the *popliteal artery*, occurring frequently, and generally proving fatal to the patient, was the disease on which the extraordinary abilities of Mr. Hunter were exercised in the instance now to be noticed.

Mr. Home introduces the subject with some remarks on the almost constant failure of the common treatment, and a description of the disease called *aneurism*, which, though remarkable for its precision, we need not repeat. He then proceeds thus:

"The *popliteal aneurism*, which we are at present to consider, is the disease above mentioned, affecting the trunk of the popliteal artery, which runs down between the two ham-strings of the thigh. From the situation of the tumor, on whatever side of the artery the dilatation is produced, it will be distinctly felt in the hollow between the ham-strings, and will be readily ascertained by a pulsation to be felt in every part of the tumor; it seems to be one of the most frequent situations of aneurism; and though it may be difficult to ascertain whether it occurs so commonly as in the aorta itself, it is

certainly found oftener in this artery than in any other branch which the aorta sends off. This circumstance, as far as I know, has not hitherto been accounted for, and what is rather curious, in many recent instances of this disease, the patients have been coachmen and postilions. The popliteal aneurism has been in general supposed to arise from a weakness in the coats of the artery, independent of the presence of disease; if this were true, we might reasonably conclude, that, except in the part preternaturally dilated, the vessel remained in a sound state, which would naturally suggest the mode of practice generally recommended, viz. opening the sac, tying up the artery above and below it, leaving the bag to suppurate, and afterwards heal up like any common sore.

“ Mr. Hunter finding an *alteration of structure* in the coats of the artery previous to its dilatation, and that the artery immediately above the sac *seldom unites* when tied up in the operation for the aneurism, so that as soon as the ligature comes away, the secondary bleeding destroys the patient, was led to conclude, that a previous disease took place in the coats of the artery, in consequence of which it admitted of dilatation capable of producing aneurism. But not satisfied with the experiments on frogs, given by Haller in support of the opinion that weakness alone was sufficient to produce the dilatation, he resolved to try the result in a quadruped, which, from the vessels being very similar in their structure to those of the human subject, would be more likely to ascertain the truth or fallacy of Haller’s opinion. That the experiment might have as much as possible the chances most likely to produce aneurism, the carotid artery, as being near the heart, was selected for that purpose.”

The proposed experiments having been made on the dog, Mr. Home describes their results as follows:

“ The *results of these experiments*,” says he, “ confirmed Mr. Hunter in his opinion, that the artery, in cases of aneurism, is in a *diseased state*; and led him to believe, that the disease often extends along the artery for some way from the sac; and that the cause of failure in the common operation arises from tying a diseased artery, which is incapable of union, in the time necessary for the separating of the ligature.

“ The femoral and popliteal arteries are portions of the same trunk, presenting themselves on different sides of the thigh, and are readily come at in either situation; but where the artery is passing from the one side to the other, it is more buried in the surrounding parts, and cannot be exposed without some difficulty.

“ In performing the *operation for the popliteal aneurism*, especially when the tumor is large, the ligature is commonly applied on the artery at that part where it emerges from the muscles. This mode of performing the operation will be found inadequate, if the disease of the artery extends above the sac; for if the artery should afterwards give way, there will not be a sufficient length of vessel

remaining, to allow of its being again secured in the ham. To follow the artery up through the insertion of the triceps muscle, to get at a portion of it where it is sound, becomes a very disagreeable part of the operation: and to make an incision upon the fore-part of the thigh, to get at and secure the femoral artery, would be breaking new ground; a thing to be avoided, if possible, in all operations.

“ Mr. Hunter, from having made these observations, was led to propose, that in this operation the artery should be taken up in the anterior part of the thigh, at some distance from the diseased part, so as to diminish the risk of hæmorrhage, and admit of the artery being more readily secured should any such accident happen. The force of the circulation being thus taken off from the aneurismal sac, the progress of the disease would be stopped; and he thought it probable, that if the parts were left to themselves, the sac, with its contents, might be absorbed, and the whole of the tumor removed; which would render any opening into the sac unnecessary.”

Mr. Hunter performed this operation at St. George's hospital, in the following instances:

CASE I. “ The patient was a coachman, 45 years of age; he was admitted into the hospital in December, 1785, with a popliteal aneurism, which he had first perceived three years previous to his admission, and had observed it gradually to increase during the whole of that period. It was so large as to distend the two ham-strings laterally, and make a very considerable rising between them; the pulsation was very distinct, and to be felt on every side of the tumor. The leg and foot of that side were so swelled as to be much thicker than the other, and were of a mottled brown colour; the swelling was not of the œdematous kind, but felt firm and brawny, probably from the extravasation of coagulable lymph; the leg retained its natural shape, excepting that it was larger. Previous to performing the operation, a tourniquet was applied upon the upper part of the thigh, but not tightened, that the parts might be left as much in their natural situation as possible.

“ The operation was begun by making an incision on the anterior and inner part of the thigh, rather below its middle, which incision was continued obliquely across the inner edge of the sartorius muscle, and made large to give room for the better performing of whatever might be thought necessary in the course of the operation. The fascia which covers the artery was then laid bare about three inches in length, after which the artery itself was plainly felt. A slight incision, about an inch long, was then made through this fascia, along the side of the vessel, and the fascia dissected off; by this means the artery was exposed. Having disengaged the artery from its lateral connections by the knife, and from the other adhering parts by the help of a thin spatula, a double ligature was passed behind it by means of an eyed probe. The doubling of the ligature

brought through by the probe, was cut so as to form two separate ligatures. The artery was now tied by both these ligatures, but so slightly, as only to compress the sides together. A similar application of ligature was made a little lower. The reason for having four ligatures, was to compress such a length of artery as might make up for the want of tightness, it being wished to avoid great pressure on the vessel at any one part. The ends of the ligatures were carried directly out at the wound, the sides of which were now brought together, and supported by sticking-plaster and a linen roller, that they might unite by the first intention.

"The limb was found, some hours after the operation, not only to retain its natural heat, but even to be warmer than the other leg. The second day after the operation, the brawny firmness of the leg was considerably diminished, it was become soft, loose, and a good deal smaller, and the aneurismal tumor had lost more than one third of its size.

"Nothing could shew more plainly the action of the absorbents, than the change the leg had undergone in so short a time; the diminution of the tumor probably arising from the fluid blood which it contained having passed into collateral branches, or into the tibial artery.

"The fourth day, on the removal of the dressings, the edges of the wound were found united through its whole length, excepting where prevented by the ligatures: there was neither pain nor tumefaction in the part; but the aneurismal tumor was the same as on the second day.

"On the ninth day after the operation, there was a considerable discharge of blood from the part where the ligatures passed out; a tourniquet was therefore applied on the artery above, which stopped the bleeding; and, although the tourniquet was taken off a few hours after, no blood followed. The head of a roller was then placed upon the wound, in the direction of the artery, and over that the tourniquet, which was not, however, tightened more than was thought sufficient to take off the impetus of the blood in that portion of the artery.

"On the tenth day appearances were much the same, only that between the compress and the knee there appeared a little fullness, like beginning inflammation. On the eleventh day this was gone off, and on the fifteenth some of the ligatures came away, followed by a small discharge of matter, the tumor in the ham being lessened. On the seventeenth day the parts surrounding the aneurismal tumor were more reduced, and pliable, so that it was distinctly to be felt.

"About the latter end of January, 1786, six weeks after the operation, the patient went out of the hospital, the tumor at that time being somewhat lessened, and rather firmer to the feel. He was ordered to come to the hospital once every week, and, in the mean time, to make some degree of pressure, by application of a compress

and bandage, with a view to excite the absorbents to action, which in most cases has a good effect.

" About the middle of February the tumor had decreased, and was become still firmer. March the 8th, the wound, which had cicatrized, broke out again, and the patient was taken into the hospital. About the 8th of April, some of the remaining thread of the ligature came away, and an inflammation appeared upon the upper part of the thigh. In the middle of May a small abscess broke at some distance from the old cicatrix, at which opening some matter was discharged, but no pieces of ligature were observed. Several small threads were, at different times, discharged from the old sore, and the swelling subsided; but the thigh soon swelled again to a greater size than before, attended with considerable pain. In the beginning of July a piece of ligature, about one inch in length, came away, after which the swelling went off entirely, and he left the hospital the 8th of July, at which time there remained no appearance of tumor in the ham, he being in every respect well.

" After leaving the hospital, the man returned to his usual occupation of driving a hackney-coach; and being, from the nature of his employment, much exposed to cold, in March, 1787, he was seized with a fever of the remittent kind, which carried him off. He had not made any complaint of the limb on which the operation had been performed from the time of his leaving the hospital.

" He died on the 1st of April, 1787, fifteen months after the operation; and leave was procured, with some trouble and considerable expence, to examine the limb, seven days after death, at which time it was entirely free from putrefaction.

" The cicatrix on the anterior part of the thigh was scarcely discernible, but the parts under it felt hard. The ham had no appearance of tumor, and was to the eye exactly like that of the other limb; there was, however, a solid tumor perceptible to the touch, filling up the hollow between the two angles of the thigh-bone.

" The femoral artery and vein were taken out above the giving off the branch called profunda, and a little below the division into the arteriæ tibiales and interossea. The arteries and veins that were pervious being injected, the whole was carefully dissected.

" The femoral artery was impervious from its giving off the arteria profunda as low as the part included in the ligature, and at that part there was an ossification for about an inch and a half along the course of the artery, of an oval form, the rim of which was solid, becoming thinner towards the center, and not bony, but ligamentous. Below this part, the femoral artery was pervious down to the aneurismal sac, and contained blood, but did not communicate with the sac itself, having become impervious just at the entrance.

" What remained of the aneurismal sac was somewhat larger than a hen's egg, but more oblong, and a little flattened, extending along the artery below for some way; the blood pressing with greater

force in that direction, and distending that part so as in some measure to give the appearance of a separate bag. The sac was perfectly circumscribed, not having the smallest remains of the lower orifice into the popliteal artery; whether this arose from the artery being pressed upon by the inferior portion of the sac, as appears to be the case in common, or was in consequence of the sac contracting after the operation, I will not pretend to determine; but it contained a solid coagulum of blood, which adhered to its internal surface. A section made of this coagulum, appeared to be composed of concentric lamellæ, uniform in colour and consistence.

"The popliteal artery a little way below the aneurismal sac was joined by a small branch, very much contracted, which must have arisen either from the profunda, or the trunk of the femoral artery. About two inches below the sac, the popliteal gave off, or divided into the tibiales.

"The profunda was of the usual size, but a good deal ossified for some length after leaving the femoral artery; the two tibials, where they go off from the popliteal, were in the same state.

"The trunk of the femoral vein, where it passed along the side of the tumor, must have been obliterated; for at this part it appeared to send off three equal-sized branches, passing over different parts of the aneurismal sac: these must have been dilated branches, none of them having the course which the trunk of the vein should have pursued.

"These appearances throw some light upon the changes which took place in the limb after the operation. The ligature upon the femoral artery impeded the passage of the blood into the sac so much as to allow its contents to coagulate, and render the opening into it from the artery impervious. By this a stop was only put to the increase of the tumor, its reduction to the size met with in the dead body, must have been the effect of absorption."

The conclusion Mr. Home draws from this account is, that simply *taking off the force of the circulation from the aneurismal artery, is sufficient to effect a cure of the disease, or at least to put a stop to its progress, and leave the parts in a situation from which the actions of the animal economy are capable of recovering them.* Mr. Home mentions a case of aneurism that recovered *without an operation*, and in which the mode of recovery depended upon this very principle.

"The aneurism," says he, "was in the femoral artery, and the swelling appeared upon the anterior part of the thigh, a little above the middle, extending upwards nearly to Poupart's ligament: an attempt was made, by compressing the artery above the tumor, by means of an instrument somewhat resembling a steel truss, to give the blood in the sac a chance of coagulating, and by that means to put a stop to the progress of the disease. But, from the pain which it occasioned, every attempt to make a permanent compression on

the artery proved ineffectual. The tumor increased to a very considerable size, a great degree of inflammation and swelling took place in the sac and common integuments, and mortification appeared to be coming on the skin. While in this state, no pulsation could be felt in the tumor, or the artery immediately above it: so that the steps preceding mortification had taken place, which put a stop to the dilatation of the sac, and all its consequences. From the time the pulsation in the sac stopped, the inflammation and swelling subsided, although very slowly; and as the tumor diminished it became firm and solid, and the patient got perfectly well.

"It appears from these cases, that surgeons have laid too much stress upon the supposed necessity of large collateral branches, to insure the success of this operation; an opinion which must have arisen from anatomical knowledge, rather than observations made from practice."

Mr. Hunter's second operation upon a trooper about forty years of age, is thus described:

CASE II. "A tourniquet having been loosely applied upon the thigh, the operation was begun by a longitudinal incision through the integuments, and the artery and vein were exposed, as in the former case, but not taken up with a number of ligatures, for nothing appeared to have been gained by such practice, and the bad effects of it were obvious in the progress of the cure; they were included in one strong ligature, sufficiently tight to prevent the pulsation in the sac, without injuring the coats of the vessels. The ends of the ligature were brought out at the wound, which was in this case dressed from the bottom. The advantages proposed by this treatment were, to be able to see the progress of the cure, and to come readily at the artery, if any unfavourable circumstance occurred; since the abscesses in the former case were suspected to have arisen from the mode of healing.

"After the operation, the superficial veins of the leg became exceedingly turgid and numerous, and the limb, although warm, became rather less so than the other, particularly the foot.

"The next day the leg was swelled, and the heat 12° lower than the other; the second day it exceeded the other 5° ; and on the fourth day the two limbs were equally warm: the patient was free from fever.

"On the fourteenth day the ligature came away, and the tourniquet was loosely applied, as a precaution against bleeding; the sartorius muscle was a good deal enlarged, and covered the passage down to the artery, so as to prevent the matter from having a free discharge, a good deal being confined behind it, and with difficulty squeezed out at each dressing.

"On the nineteenth day there was an hæmorrhage from behind the muscle, the swelling of which rendered it nearly as difficult to come at the vessel, as if the parts had healed by the first intention;

the bleeding was stopped by applying pressure, after having lost about ten or twelve ounces.

"On the twentieth there was a slight bleeding, which was readily stopped: yet five hours afterwards the femoral artery gave way, and he lost about one pound of blood before the tourniquet was applied. The artery was laid bare, and tied a little higher up, the patient being very weak and low; in this state he continued till the twenty-third day without bleeding, when it bled again from a small vessel. On the twenty-sixth a considerable hæmorrhage having taken place, he became faint, then delirious, had vomiting with hiccough, and died the same day.

"Upon examining the limb, sinuses were discovered both upwards and downwards, in the direction of the artery and sartorius muscle, besides smaller ones in different directions.

"In this case, the bad consequences and death of the patient do not appear to have arisen from the operation, but were entirely the result of the mode of treatment afterwards, as will appear from the following cases."

CASE III. Mr. Hunter's third trial was made on a postillion, thirty-five years of age. "Compression upon the femoral artery was attempted, but the pain was so great that it could not be continued.

"In performing the operation only one ligature was used, and the parts healed by the first intention.

"On the seventh day after the operation, the first dressings were removed, and a good deal of matter came out by the side of the ligature. On the fourteenth the ligature came away, and in four weeks the wound healed.

"The sac in the ham, from being chafed previous to the operation, burst at this time, but healed up like any other sore; and at the end of three months he was perfectly recovered."

CASE IV. Mr. Hunter's fourth patient was a coachman, 36 years old.

"The tumor in the ham was not very large, and situated lower down than usual, the whole leg being swelled, and the veins turgid. The pain he complained of was exceedingly violent, but being in a very bad state of health, an operation was not thought advisable, and gentle pressure on the tumor was attempted; but, from the pain it occasioned, the operation was had recourse to, as the only chance of saving his life, although, from the irritable state in which he then was, even that seemed a forlorn hope.

"In performing the operation, the vein was not included in the ligature; but in other respects it was similar to the former.

"Immediately after the operation, the limb was benumbed, and continued so for some time, which was singular, as the nerve had not been included. It became, on the same day, four or five de-

grew hotter than the other leg, and continued so for the first fourteen days, when the temperature became the same as that of the other limb.

"The sixth day the first dressings were removed, and the skin was united every-where except at the passage of the ligature. It remained in this state till the twenty-first, when the cicatrix inflamed and ulcerated, with a sloughy appearance, and hardness up the thigh.

"On the twenty-ninth day the ligature came away; the fore now put on a better appearance, suppuration took place where the hardness had been in the course of the artery, and the parts became softer, the discharge gradually diminished, and in the seventh week the wound was healed.

"But it did not continue so; for in three days an inflammation took place, and an abscess formed and burst at the cicatrix, which also healed up.

"About the end of the tenth week he was attacked with a very severe remitting fever, which lasted fourteen days, and left him much reduced; but in the fourteenth week he was so far recovered, as to leave the hospital and go into the country, for the recovery of his health."

CASE V. The next upon whom Mr. Hunter performed this operation was Joseph Caswell, aged 42, a man not accustomed to horse exercise, or any mode of life which could in the least assist in producing the disease. The aneurism was in the ham of the left leg.

"In performing the operation, the artery alone was included in a strong single ligature, and the wound was healed by the first intention, leaving a passage for the ligature. The local inflammation was extremely small, and consequently attended with little sympathetic fever. The ligature came away the eleventh day, and in five weeks he went into the country, able to walk with a stick, the wound perfectly healed.

"In this case the heat of the two legs was carefully examined twice a-day, from the second to the ninth after the operation, and the limb operated upon was uniformly colder than the other.

"He came to town six months after the operation, and said that the left leg was fully as strong as the right, but, when exposed to cold, he was more sensible of its effects upon that leg. About two months after the operation he had a violent pain in the upper part of the left foot, similar to what is felt when a nerve is pressed; this lasted for about six weeks, and afterwards went entirely off. As no nerve was included in the ligature, this affection probably arose from the nerve in its passage through the consolidated parts being deprived of its natural freedom. There was a small tumor, the remains of the aneurismal sac, very distinctly to be felt in the ham, but without pulsation, and to the feel perfectly solid."

In the hands of others, this mode of treatment has been attended with various circumstances material to mention. The next case was treated by Mr. Lynn, surgeon of the Westminster hospital. His account of the operation is the following :

CASE VI. "Samual Smart, a hackney coachman, 25 years of age, had a popliteal aneurism, for which I performed the operation in the following manner. I made an incision down to the femoral artery, a little below the middle of the thigh, and having separated the artery from the contiguous parts, I passed under it, by means of an eyed probe, a broad ligature, which was tied so as to cut off all communication with the tumor, and the lips of the wound were brought together, and retained by sticking-plaster, and the patient put to bed ; this leg being rather colder than the other, was ordered to be fomented. The next day he was free from pain, and the limb was warmer than the other.

"On the fourth the dressings were removed; and the parts were found united, except at the ligature.

"On the thirteenth the ligature came away, and in the course of the month the whole was healed, and the patient soon afterwards perfectly recovered."

The case of aneurism next described is of the femoral artery, by Mr. Birch.

CASE VII. "John Lewis, a negro, aged 43, received a blow on the anterior part of the right thigh ; about a month after he perceived a small tumor, which gradually increased, and his own expression was, that he could feel it thump, thump.

"As the tumor enlarged, he came to London for advice, applied at St. Thomas's hospital, on Thursday, the 26th of October, and was directly admitted. On examination I found a large tumor, extending within two inches of Poupart's ligature upwards, and occupying two-thirds of the thigh ; a pulsation could be felt, and there was no doubt of the disease being an aneurism of the femoral artery.

"I directed seven ounces of blood to be taken from the arm, and an opiate to be given at night ; the patient rested well, and the next day a consultation was held, in which it was proposed to perform an operation, and endeavour to pass a ligature round the femoral artery, giving the patient the chance of nourishing the limb by the arteria profunda, and other anastomosing vessels.

"On Friday, the 3d of November, it was determined to perform the operation ; Mr. Cline undertook to compress the artery as it passes through Poupart's ligament, which he easily effected with a hard compress, in the shape of a T, with a broad basis.

"It was agreed, previous to the operation, that an incision should be carried in a semilunar form round the upper part of the aneurismal sac, in order to make room for the longitudinal incision necessary to dissect down to the artery ; this was accordingly done, and the integuments raised, so as to make room to feel for the pul-

sation of the artery ; some portion of cellular membrane and lymphatic glands were necessarily dissected and removed : with my fingers I then separated the muscular fibres, and tore away the connecting parts till the artery could be plainly felt in pulsation ; it was then necessary to divide a part of the fascia covering the artery, which was done by carrying the back of the knife on Mr. Cline's nail, while his finger pressed upon the naked artery ; after which the finger and thumb could surround and compress the vessel ; an eye probe, armed with a strong flat ligature, was then pushed through the cellular membrane, and carried under the artery. This being effected, we had such command of the vessel as to be able to strip it down, and pass another ligature somewhat lower. This last ligature was then tied, the first being left loose, to secure against accident.

“ The threads being separated and secured, the wound was lightly dressed, the tumor left in its natural situation, and the patient put to bed, with the loss of only four or five ounces of blood during the operation. No pulsation could be perceived in the tumor after the ligature was tied.

“ On Saturday, November the 4th, he had slept well, was easy, and there was sufficient warmth in the extremity to assure me of some circulation. On the 5th the discharge from the wounded lymphatics was so abundant, as to make it necessary to remove the superficial dressings ; the tumor was rather softer to the touch, and the skin about the apex of it began to shrivel.

“ The discharge of lymph continued till the 9th, and then the wound began to digest, affording, however, a very small quantity of pus. The tumor grew thinner at one point, and seemed as if disposed to ulcerate the integuments. This day I passed a bleeding ligature round the leg, just below the knee, and the veins tumified sufficiently to have bled freely if they had been punctured.

“ 10th. He was feverish in the evening.

“ 11th. He had stools from some laxatives I had directed, and was better.

“ 12th. The tumor was very thin at one part, and a fluctuation evidently to be felt. The limb was warm and moveable ; but the patient was feverish, and delirious at night : a decoction of bark, with a sedative bolus, was directed for him, but he would not take them.

“ 13th. The wound looked florid, and afforded good pus ; the patient was feverish and delirious ; the tumor was threatening to burst. This day he took his medicines.

“ 14th. He became sensible, but was languid and hot ; the tumor burst, and discharged serum and grumous blood ; he fainted ; the dressings were not disturbed ; he slept composedly ; fainted again about six o'clock in the evening, and expired. I saw him at seven, when the limb was still warm ; I removed the dressings, and found

a small stream of fresh arterial blood which had issued from the wound."

Mr. Birch thought it probable that if the patient had applied for relief before the tumor was *so much enlarged*, the operation might have succeeded, as he could then have tied the found artery much lower down. It appeared, when the body was examined, after death, by Mr. Cline, that,

"The integuments on the middle of the tumor were mortified. The blood contained in the tumor was very putrid, and the greater part of it fluid, it appearing to have been dissolved by putrefaction.

"Water, injected by the external iliac artery, escaped freely from the wound at the ligature where the artery was open, and appeared to have ulcerated at that part.

"In laying open the artery from the ligature to the heart, its *internal surface appeared of a bright red*. This appearance lessened at the curvature of the aorta, yet it was very evident in its semilunar valves.

"The arteria profunda, which passed off from the femoral artery rather less than half an inch above the ligature, was also inflamed within. There were near two inches of the femoral artery between the ligature and the aneurismal sac, the internal surface of which was of the usual white colour; from this a membranous-like substance could be peeled off that seemed to resemble coagulable lymph.

"The opening where the artery passed out of the aneurismal sac was near three inches below the part where it entered. On opening this part of the artery, from the sac to the ham, it appeared quite sound, and of its natural colour."

Mr. Cline, in St. Thomas's hospital, performed the operation for the popliteal aneurism in the following manner:

CASE VIII. "The patient was a sailor, who came into St. Thomas's hospital to undergo the operation for the popliteal aneurism.

"Mr. Cline made a longitudinal incision on the anterior part of the thigh, and having laid bare the artery, passed, by means of a tin instrument, a double tape, about one inch broad, behind the artery, the two pieces of tape lying one over the other. The piece of tin which conducted the tape was cut off, and a cork, nearly an inch long, was laid upon the artery, and confined to its situation by means of the upper tape, producing in this way a sufficient pressure upon the vessel, included between the ligature and cork, to stop the circulation, and consequently the pulsation in the tumor in the ham: the other portion of tape was left loose. The intention of securing the artery in this way, was to compress the sides of the vessel together, and produce an union without ulceration.

"The patient went on very well; on the ninth day the tapes were removed, and every thing seemed to be going on very favour-

ably, when the patient was attacked by a fever (which was supposed to be caught from another patient in the same ward), of which he died.

"Upon examining the state of the limb, after death, it was found that ulceration had taken place through the whole extent of the artery included in the tape; and sinuses were formed both upwards and downwards, in the course of the thigh, to some distance."

The last case related is from a communication of Sir James Earle.

CASE IX. "John Smith, about 50 years of age, was received into St. Bartholomew's hospital on account of a fever. After having been under the care of the physician some time, he complained of a swelling and pain in his left leg, for which I was desired to visit him. He said, about six months before, he had fallen from a scaffold; that his leg was caught between the rounds of a ladder, which broke his fall; that he felt immediately pain in the upper part of his leg; soon after it began to swell, and had gradually increased to its present size. On examination there appeared a large hard swelling under the heads of the gastrocnemii muscles, reaching up to the bend of the leg. A pulsation was plainly to be felt in it, and there was no doubt of its being an aneurism. It was now increasing very fast in size; the tumor, by its pressure, caused exquisite pain, all the lower part of the leg was loaded with œdematous swelling, and it became absolutely necessary to perform some operation to prevent a mortification taking place.

"Having noticed, with much satisfaction, the success which attended Mr. Hunter's method of tying the artery in the thigh, in a similar case, I decided in favour of that operation; but as, in the present instance, the artery appeared to be in its natural and perfect state in the ham, and in its whole course, till it reached the dilatation below the knee, I preferred taking it up in that part, rather than to tie it in the middle of the thigh, under the sartorius muscle; though it lies there more superficial, and more easily to be got at; because I thought the chance of the circulation being carried on was equal, if not greater, and if it should fail, and symptoms should occur to create a suspicion of an impending mortification, there might be an opportunity of removing the limb above the ligature, which would be impracticable if the artery was tied in the middle of the thigh.

"Jan. 28, 1792. The patient being laid on his face, and the tourniquet loosely applied, I made an incision about five inches long in the direction of the artery, within those tendons which compose the inner ham-string. I then gradually separated the cellular substance; in doing this the nerve was exposed, which ran, in its usual course, external to the artery, and much more superficial. In finding the artery, some difficulty occurred, on account of the tumefaction of all the parts, affected by their vicinity to the aneurysm, and

from the imperceptibility of pulsation in the artery till it was actually laid bare: however, having discovered it in its usual situation near the bone, and in its natural undilated state, I passed a ligature round it, about two inches above the tumor. I now again examined, and being convinced that the artery was included alope in the ligature, I gradually made it tight, till I felt a pulsation above it, and none below, when I desisted, concluding that any pressure beyond this degree would be useless and dangerous.

"I will just observe here, that I found the common aneurismal needle with a handle very inconvenient, and would recommend in this case, where the artery lies so deep, a blunt semicircular needle, with the eye about half an inch from the end, without any handle.

"The wound was closed in the usual manner, and the edges brought together by sutures. On the following day the man was free from pain, the tumor much less tense or hard, and the whole leg greatly unloaded. No perceptible alteration in the heat of the limb could be remarked; when the current of blood was obstructed in the superficial veins by pressure, on its removal they immediately again became turgid; and, in short, every appearance indicated a continuance of perfect circulation.

"On the 15th day succeeding the operation the ligature came away, the limb was soft and unloaded, and the incision nearly healed; at the distance of six weeks there remains a small tumor, with some perceptible fluctuation. The patient cannot perfectly extend his leg, but is able to walk with the assistance of crutches."

Mr. Home closes his remarks with very suitable reflections on the foregoing, and some other, cases, which the desire of brevity has induced us to omit.

"I cannot conclude this paper," says he, "without observing, that it is seldom, in giving an account of a new operation, we are able to collect materials sufficient to render it so satisfactory as the present, having in our possession not only the successful and unsuccessful cases, but also an account of the appearances after death, under both circumstances; so that the causes of failure are rendered evident in those instances in which it did not succeed, and the means that are likely to insure future success are clearly pointed out.

"The operation is in itself simple; it requires but a short time in the performance, and produces little, if any, affection of the constitution; but its advantages are more clearly seen by contrasting it with the common mode of operating for the popliteal aneurism. This is by exposing the sac in the ham through its whole extent, laying it open, scooping out the blood, searching for the two orifices leading into it, and taking up the artery with a ligature both above and below the sac. When this operation is over, there remains a large deep-seated sore, composed of parts not perfectly in a natural state, and in a most disadvantageous situation; which sore is to suppurate, granulate, and heal; a process that is not soon ex-

formed, and which must leave a stiff knee for some time afterwards. Yet this is considering the operation in the most favourable view, since there is always a risk, from the artery being diseased so close to the sac, of the patient dying from a secondary bleeding; and when that does not happen, there is still some danger of not being able to support the constitution during the healing of a large sore, under circumstances so very unfavourable.

“ It is in comparison with this operation, the only one before in use, that the present improvement is to be considered; and it is in this view that I have thought it deserving the attention of the society.”

In the second volume of the valuable publication from whence Mr. Home's remarks are derived, several additional facts appear; but for these we refer the reader to the work itself, from whence, however, we select the following history of a *spontaneous cure of aneurism*, by Mr. Wilson, which we think too extraordinary to be passed by.

CASE X. “ Richard Donovan, 32 years of age (who had for many years followed the laborious occupation of a blacksmith), in the month of October, 1796, perceived that his right leg was considerably swelled. The swelling was constantly augmented towards the evening (especially about the ankle), but in the morning when he arose was scarcely perceptible. He had not laboured under any illness before the appearance of the swelling, except a slight pain in the side, which had continued for some months, and which, about this time, had entirely left him. This swelling of the limb gradually subsided, and at the end of two months totally disappeared. At this time a small circumscribed tumor took place in the ham, attended with pulsation, a slight degree of inflammation, and a great deal of pain, particularly when the limb was in motion. The patient derived considerable relief from lying in a horizontal posture, but he passed very restless nights.

“ About a week after the first appearance of the tumor, it was of the size of a walnut, and in a month as large as a hen's egg. The pain increased in proportion, so that the limb did not admit of flexion, or of full extension, without occasioning excruciating agony to the patient. In this situation he applied to an apothecary, who recommended to him the use of a liniment and mercurial friction. But finding that the tumor still increased rapidly, he applied to the Westminster dispensary for assistance, and was informed that an early operation was absolutely necessary. From this he was recommended to Mr. Lynn, of the Westminster hospital, who corroborated this opinion. At that time the patient seemed to consent, and accordingly agreed to be at the hospital on the following day. However, instead of coming there, he procured admission into St. Thomas's hospital, where he became Mr. Cline's patient. Upon a consultation, the surgeons were all of opinion, that nothing but an

operation could save the life of the patient. To this, however, the man determined not to submit. He left the hospital in a few days, and applied to an empiric, who undertook to cure him in a fortnight. At the end of this time, the swelling had become very large, and the pulsation was but little diminished. He then applied to another empiric, who told him (to his extreme distress) that the tumor was a white swelling, and advised him to have immediate recourse to mercurial friction upon the part affected, and to rub a red ointment upon the sole of the foot. The complaint still continued its progress till February, 1797; at which time the tumor was as large as a man's head. The skin over the whole extent of the tumor was become greatly inflamed and very tense, and the pain almost intolerable. The pulsation was now only to be discovered by pressing firmly with the fingers upon the superior part of the tumor. His appetite however still continued good, and his bowels regular.

“ At this period, the patient consulted another surgeon, who at once perceived, from the advanced state of the disease, that nothing could be expected from the operation for the aneurism; he therefore advised the immediate amputation of the limb; but the patient being willing to procrastinate the operation, procured admission into St. Bartholomew's hospital; his stay here, however, was very short; for learning that an operation was proposed, he went away in less than a week after his admission. During his stay in the hospital, the diseased knee was cupped and scarified.

“ On the day preceding his departure from the hospital, one of his crutches slipping, occasioned him to fall to the ground, by which accident the swelled knee was much bruised, but there was not at that time any other apparent injury. On the third day from the accident, he perceived (at the same instant) two distinct tumors, each of which was about half an inch in diameter, attended with violent pulsation, and a slight degree of pain, situated high upon the course of the femoral artery of the left thigh; they enlarged very quickly, and the limb upon which they were seated was considerably benumbed.

“ In this condition he was admitted into the Westminster hospital, under the care of Mr. Lynn, with no expectation beyond that of rendering the remainder of his life tolerably comfortable, as far as his situation would admit of it. The outside of the thigh and leg, upon which was situated the popliteal aneurism, was, like the other, much benumbed; and for more than nine weeks there had not been any pulsation in the tumor, which may be attributed to the very numerous layers of coagulated lymph within the aneurismal sac. It was now thought that the pulsation of an aneurism of the aorta below the diaphragm could be felt, so that as there was a general tendency to this disease, there was no chance of success by operation. Shortly after the patient's admission into the hospital, the skin of the tumor

in the ham became considerably inflamed and tense, with such excruciating pain, that large doses of opium were required to allay it. An oozing of bloody serum had already taken place from the most depending part of the tumor, where the cuticle had burst; and as every moment seemed to threaten the destruction of the patient, the tourniquet was constantly kept in readiness for application.

"Such was the patient's miserable condition, when (having resided seven days at the hospital, and finding that no further relief was likely to be obtained) he insisted upon being removed to his lodgings, notwithstanding every argument to point out to him the very great risk he ran of hastening his dissolution. The oozing of serum continued for some days after his leaving the hospital, nor was the pain at all diminished. His appetite remained good, but he was rather costive.

"On the 6th of May (being the ninth day from the first appearance of the serum), when in bed, he had suddenly the sensation of a fluid running down his leg; upon examination, he perceived that the integuments of the tumor in the ham had given way, and that the blood was rushing from the wound in such quantity, that in the space of five minutes, four pounds were lost. During this time he fainted repeatedly. On the 8th, the wound was become much enlarged, discharging large lumps of coagulum occasionally during fourteen days.

"By this time the knee was nearly reduced to its natural size, and the wound discharged a thin matter, which was gradually succeeded by a discharge of pus. When this violent hæmorrhage from the ham had subsided, the patient observed, that the lowest of the crural aneurisins had altogether lost its pulsation, and was gradually diminishing, whilst that situated nearest to Poupart's ligament was rapidly increasing, and extremely painful. His appetite was, notwithstanding, very keen, and his bowels regular. In this situation the patient was a second time admitted into the Westminster hospital, where (by Mr. Lynn's direction) moderate and uniform pressure was made by a flannel roller upon the tumors in the thigh; and the wound in the ham was superficially dressed. The discharge continued very copious for fourteen weeks, and varied in its appearance according to the state of the health of the patient. He was supported with cordials and nutritious diet; and at the end of four months from his admission into the hospital, the wound was completely cicatrized.

"The scar (although the ulcer had been four inches in length, and very deep) was reduced nearly to the narrowness of a line.

"In the mean time the aneurisins upon the thigh (the pressure having been continued until a slight degree of tumefaction had taken place over the limb) had approached so nearly to each other, as to form, apparently, one tumor, without any pulsation. In the course of two months it was considerably softer and less painful.

"Before the patient quitted the hospital (which was on the 10th day of January, 1798) it was so very much diminished in size, as to be scarcely discerned when his breeches were on. It was perfectly soft, and gave no uneasiness. He at this time (February 19th) enjoys a tolerable state of health, having no other complaint than a weakness of his lower extremities when he continues long in the erect posture. The left extremity, upon which were seated the crural aneurisms, is considerably less than its natural size. The other is the most serviceable limb, although it is shorter by two inches; the effect of the mischief is in the ham."

In No. XXXIV. of the Medical and Physical Journal is given the following case of an aneurism from a puncture of the humoral artery, cured by pressure above the injury, in a letter from Dr. Adams, of Madeira.

In the beginning of February, 1797, a young baronet, at Madeira, was bled in the median basilic vein on account of pulmonary complaints threatening consumption. Considerable extravasation of blood afterwards appeared in the arm, which was imputed to the laxity of the cellular membrane in this subject. The orifice was tender, and did not heal readily. In a few days, however, it was thought so much better as to render any further attendance unnecessary, and no mischief was suspected till the middle of March, when, meeting Dr. Adams at a dinner party, he requested to see him the following morning.

"I then learned," says the doctor, "that the arm had never recovered its original size, and that a day or two before a small tumor had arisen. It was lower in the arm than the cicatrix, and, on pressure, a very obscure pulsation might be perceived: it was firmly bound by the fascia, and not at all discoloured or painful. In this stage it was not easy to discover whether an abscess was forming, from a small portion of blood remaining unabsobered and losing its life; or whether, what was most to be dreaded, an artery had been wounded. In the latter case there was a fair presumption at least, that the wound might be through a vein so as to form the varicose aneurism. At all events, if the case was true aneurism, there could now be no other remedy but the operation; and as the incision had been made six weeks, there was too much reason to suppose that the artery must be dilated, beyond the orifice. If, therefore, the operation should be performed higher up, according to the improved practice, no inconvenience could arise from deterring it for the present.

"In this situation things remained till the 20th of March, when my patient made a tour of a few days into the country. On his return the tumor seemed increased; but as that was doubtful, a measure of the arm was taken to ascertain its future progress. For a fortnight it remained stationary, when it suddenly increased with the same circumscribed appearance, and an evident surrounding

fused extravasation. A strong pressure was now applied on the upper part of the artery where it rises superficially. From the lax state of the cellular membrane the vessel could be so pressed against the bone as considerably to lessen its pulsation. In order to protect the circulation in the rest of the limb, pieces of cane, armed with linen, were placed under different parts of the bandage to keep it hollow. By these means there was reason to expect that the diameter of the artery might be lessened, and its collateral branches increased, which would very much lessen the future inconveniences of an operation. Nor was I without hopes, as my patient found no inconvenience from strong pressure, that it might be gradually increased so as to obliterate the artery altogether. But either from the difficulty of keeping the bandage fixed, or because the degree of pressure was unequal to the intended object, in about ten days we had an increase of tumor, attended with all the former appearances, and for the first time with a slight degree of pain.

"It now became necessary to take some decided step, and as the high operation was in some respects new, I could not but be anxious to have the assistance of a surgeon who had recently left the busy scenes of improvement and practice. His Majesty's ship the *Terpsichore*, at that time appearing in our roads, I called the surgeon of it, and the only British physician in the island, to my assistance; but had the misfortune to stand alone in my proposal of either performing the operation higher up in the arm, by a single ligature, or trying the effect of pressure only. Some other difficulties which occurred, determined me to proceed with my patient to the fleet before Cadiz, in order to procure the best assistance circumstances would permit.

"Finding he had felt so little inconvenience from pressure on a former occasion, I resolved to try the use of the tourniquet, keeping the fillet hollow by circular pieces of wood under it in different parts. It was hardly credible how little uneasiness this was attended with, though the pressure was so considerable as almost to stop all pulsation at the wrist, and even to occasion some œdema in the hand. This last circumstance made me anxious for some apparatus that might press more immediately upon the artery, and leave the rest of the limb as free as possible. On enquiry, the surgeon of the frigate recollected a small inguinal truss which was not in use.—This was directed to be cut somewhat shorter, and to be bent to a smaller angle. The bulb was fixed about the middle of the humerus, immediately over the artery, which it pressed so close to the bone as to prevent all pulsation in the tumor. My patient, however, felt no uneasiness; and though on feeling the hand it was sensibly colder than the other, he perceived no numbness nor sense of cold. The truss was fixed on about four in the afternoon, and remained so till between nine and ten, when it was the custom of the cabin to retire to rest. The instrument was still left on; but as the

arm rested on the bed on one side, and had the pressure of the clothes on the other, and also as there was no longer the roughness of the woollen coat to resist the leather, it was not probable the apparatus should long remain steady. About midnight I was awakened from my illusive expectations of success to hear my patient, for the first time, complain of extreme pain. I found the instrument so far from pressing on the artery that it seemed scarcely to make any pressure at all. The tumor was so perfectly solid, that there could be no doubt the blood had coagulated. There was no pain near the part pressed upon, nor any-where higher in the limb than the aneurism, but immediately under and below it. If this arose from the pressure of the solid coagulum, which the patient described as hard as a brickbat, the only remedy appeared by warm fomentations to relax the parts as much as possible. These were continued for an hour and a half before the pain entirely subsided, though there were frequent intermissions. After this the patient rested till day-light. In the morning he was somewhat feverish, with occasional but slight returns of pain, chiefly in the fore-arm. The whole arm was thickened from the part to which the pressure had been applied to the wrist, and two of the fingers were insensible. About nine he arose, and during the rest of the day had frequent returns of what he styled tearing and rending pains in the fore-arm and wrist. At night an obscure pulsation was perceived, the aneurismal tumor considerably increased, and the patient complained much of its weight.

“ The following morning the tumor remained of the same size; but the skin was florid, transparent, and about the centre purplish, intermixed with parts of a paler hue. I was now more alarmed than before. The fingers remaining insensible, and the pulse at the wrist very obscure, there was reason to believe that if the artery had recovered itself, it was only as low as the tumor: hence it was impossible to calculate what might be the consequence of the whole force of the heart and arteries urging the blood against a part which seemed already giving way.

“ As, however, pressure had succeeded in obliterating part of the artery, there was every thing to hope from a more regular continuance of it. The thickening of the arm rendered it difficult to fix the truss in such a manner as to press sufficiently against the bone. A part higher up was therefore preferred, not more than two inches from the axilla, the truss was bent to a still smaller angle, and a number of pieces of wood, of a wedge shape, were prepared to place under the smaller end, in order to increase its pressure *ad libitum*. Under the thick end was placed a small square piece of wood, formed like that of the tourniquet. The smaller end pressing on the artery, a groove was made on the broader and upper part to receive the edge of the truss. That no time might be lost, the

apparatus was applied as soon in the morning as my patient could be placed on the sofa, with his arm extended on a stool.

“ After about an hour he complained of intense pain between the tumor and the part to which the pressure was applied. On examination I found, that in spite of all my endeavours the artery had recovered itself, and this pain seemed to arise either from the blood again distending the contracted part of the artery, or from the vessel itself attempting to dilate, notwithstanding the resistance of the trufs. This appeared the more certain, because a pulsation, not very obscure, could be felt below the pressure; and because, on the application of my finger immediately over the artery, the pain ceased. The apparatus was placed on a fresh and thicker wedge at the small end of the trufs; but in the space of half an hour the pain returned, and was easily relieved by elevating the narrow end of the trufs so as to increase the pressure. As my patient found immediate relief from this, he expressed no longer any wish to have the trufs removed. For about six hours the pain recurred at intervals, though in a slighter degree, and was always removed by the same means. The last paroxysm was whilst at dinner. After this he felt so great a drowsiness come over him that it was difficult to keep awake, though he continued to eat. It seems at least probable, that the blood ceasing altogether to flow through the artery, produced, for a short time, a fulness in the vessels about the brain sufficient to occasion this heaviness. In the night he had pains in his hand and fore-arm, but slept tolerably well. In the morning the arm appeared thickened from the part pressed downwards. All the fingers and thumb were insensible, though warmer to the feel than those of the other hand, thickened, and of a florid complexion. A pain was felt alternately at the back of the hand, and the inside of the fore-arm; and the veins of both, whenever the pain occurred, were particularly turgid. Cold saturnine applications seemed to give some relief, but elevating the hand still more.

“ The occasional exacerbations of pain continued without violence, and with less frequency, for three days, after which they never returned. There was, however, as the patient expressed it, a fidgety kind of a feel about the hand for some days after; and it was curious to observe, as the thickening of the arm gradually subsided, so as to expose the more superficial veins, how much they were contracted in their diameter.

“ I have described the pain, from the time the artery was closed, as seated altogether in the veins. It is extremely difficult to reason from a single instance, but a constant attention to every the most minute particular, may allow a larger latitude than the common course of practice. From this I should not scruple to say, that the pain arose from the valves of the veins being overstretched by a column of blood falling back suddenly upon them. Though it is

well known that every part of the vascular system contracts its diameter in proportion to its contents, yet it is not less certain that the veins, besides that they are more numerous, do not possess this contractile power equal to the arteries. Hence the sudden deprivation of such a portion of blood as the humeral artery affords, must produce a deficiency first in the extreme branches of the veins; in consequence of which, the valves not being supported, a column of blood would be likely to fall so suddenly upon them as to produce intense pain from the novelty and suddenness of the sensation.— That this is really the case I had a remarkable illustration in an aneurism of the temporal artery, which the polite attention of the medical gentlemen of the English naval hospital at Lisbon gave me an opportunity of examining.

“ This case was of two years’ standing; and, from the obstinacy of the patient, no means had been used for his relief. The whole artery was dilated from the temples on each side over the cranium. The man was subject to violent paroxysms of pain, which he felt not in the artery, but immediately above the nose where the veins are superficial. Without, however, insisting on this cause of the pain, the fact itself, strengthened by the observations of others, shews that there is frequently a kind of sympathy between arteries and their corresponding veins.

“ In the first case related by Mr. Home of popliteal aneurism, the femoral vein was found obliterated. In the second case, immediately after the operation, the superficial veins of the leg became turgid. In this operation the vein was included in the ligature, but those remaining were more than sufficient for whatever blood could be conveyed after the destruction of the artery. Morgagni furnishes instances much more striking than these: I need only refer you to XL. 23. Those of VIII. 11, and XLIII. 22, may be ascribed to a gradual enlargement in the artery, which produced a necessity of the same in the veins. Still, however, the exact correspondence is worthy remarking. But the most striking case is that related by Haller, in his *Pathological Enquiries*, xix. Here the left carotid artery and jugular vein were both filled with a white, soft, and firm substance. In xx. (note) we are referred to a case of aneurism of the aorta, in which the vena cava was filled with a fat medullary substance. These hints are, however, only thrown out for your future observation on cases that are so frequently offering themselves to you.

“ That I might as little as possible interrupt the history of the symptoms from pressure, I have taken no notice of the tumor since the evening after the first application of the truss. The skin grew more transparent, and discovered under it a blacker appearance. In about two days the cuticle peeled off, and a black coagulum appeared covered with a thin pellicle, either *rete mucosum*, or *stratum* of coagulable lymph. The smell was that of putrid animal matter.

On the following day a large quantity of serum, tinged with red particles, was discharged; the coagulum was extremely putrid, and had all the appearance of mortified integuments. I was not, however, at all alarmed at this appearance. It required no superior sagacity in one who had traced the whole progress of the mischief, to see that the coagulated blood which had retained its life, and probably taken vessels to support that life, as long as it could be useful in closing the orifice of the artery, had now lost its life, and being too considerable to be absorbed, was to be thrown out like any other extraneous body. For three days the aperture of the skin continued to enlarge, and at the lower edge had a sloughy appearance. In every other part it was easy to see that the putrid coagulum was totally distinct from the integuments. The appearance was, however, so formidable as to alarm the surgeon of the frigate; and three days after, when we arrived at the fleet, and the case had become still more marked by a hollowness, without suppuration between the coagulum and integuments, the surgeon-general could not be convinced that the whole was not mortification of the original parts.

“ The aperture continued to enlarge to a circle, the diameter of which could not be less than two inches, after which it became stationary. The discharge continued of the same complexion and quantity for three days; after which it became limpid, but for three days more in as great a quantity as ever. From that time it began to lessen, the putrid coagulum to be elevated, and gradually thrown out, the œdema in the arm to disappear, and the orifice to contract. By degrees a redness was discovered at the bottom which looked like granulation, but was, in fact, only the muscles exposed by the removal of the coagulum. During this whole time no applications were used but dry lint; the fore never was painful nor troublesome after the serous discharge ceased. The fingers remained insensible and useless for several days; after which the joint nearest the hand acquired some motion; and in about three weeks after the successful application of pressure, all but the thumb and fore-finger had acquired motion. In the mean while the superficial veins began to enlarge, an obscure pulsation could be perceived at the wrist, and it was curious to observe a circumscribed line in each of the nails which divide the extreme part of a dusky hue from that nearer the root, which had the splendour and semi-transparency of living nails.

“ It was full three weeks more before the fore-finger and thumb recovered themselves at all; even then the limb was weaker than the other, and colder to the touch. It was, however, equal to all the common purposes of life; and when we parted at the Tagus, no difficulty was found in managing a full decanter without the help of the other hand. This was on the 11th of July. By letter of his own writing, dated January, 1798, it appears, that even then the first joints of the thumb, fore-finger, and mid-finger, had not acquired their original strength. ‘ These inconveniences,’ he adds,

'are so trifling, that I should not have mentioned them had you not desired me to be very particular.' The fore had completely cicatrized before the conclusion of the month of July, 1797.

"The case above related having risen from one of the most common operations in surgery, it is of some importance to trace the causes that might contribute to it, and also the manner of relief. The pressure of the flannel waistcoat, mentioned at the beginning of this paper, probably obscured the pulsation of the artery so as to prevent its being felt before the operation. To the same cause may be imputed the want of force and of saltus in the flow of blood after the incision. This is not meant as an apology, but a confession; because, without doubt, every part of the arm should have been examined, and the sleeve have been opened to prevent any embarrassment in the operation. I have before remarked, that an old cicatrix was chosen, on which the patient, to use his own language, had been bled a hundred times before. This occasional alteration in the course of the vessels is too well known to require any comment. The attempt to stop the blood by pressure, below the orifice, did not succeed: but the uncertain division of the veins at this part often occasions this difficulty. When the pressure was applied immediately over the orifice, the bleeding was stopped much more easily than often happens from venæsection in hot weather. These are the only extenuating circumstances to be offered for not discovering the error at first. Had it been otherwise, there is no reason to doubt but a competent pressure over the orifice, and above it, might have prevented all the subsequent mischief.

"In the second stage of the disease, six weeks after the accident, the artery might as well have been obliterated as at any subsequent period, by which means the extravasated coagulum might have been absorbed, and the inconveniences of a large fore avoided. But it will at once occur to the medical reader, that the obliteration of a large artery is not an experiment to be made on conjecture. I have already traced my doubts on that subject; and though men, who have seen little, and write much, can readily give an unembarrassed opinion; yet, to me, it is sufficient that one who knew too well the value of truth to sport with it (see Hunter on the blood, page 196), is not ashamed of expressing his doubts on ecchymosis."

Dr. Adams offers one important enquiry on this manner of treating aneurisms. He says,

"As the aneurism did not arise from injury, the sac was consequently entire, which is no inconsiderable advantage under such a mode of cure. For if the blood is once coagulated in the sac, and in the portion of artery below it, the cure must follow; because the sac being impervious can only be distended to a certain degree; after which the flow of blood, lower than the superior branches of

the artery, would be effectually prevented. Hence we might expect those appearances described by Mr. Home. 'The tumor,' he observes, 'increased to a considerable size; a great degree of swelling and inflammation took place in the sac, and common integuments and mortification appeared to be coming on the skin. — While in this state no pulsation could be felt in the tumor, or the artery immediately above it, so that the steps preceding mortification had taken place, which put a stop to the dilatation of the sac and all its consequences.'

"Though no one is more ready to admit that harmony of action which Mr. Hunter has so beautifully traced in many parts of the economy; yet, in the present instance, Mr. Home seems to me to have presumed upon it where it cannot be proved, and where it is altogether unnecessary. To account for the coagulation of blood in arteries above a mortified part, we need only refer to the same source as Mr. Home quotes. 'There is,' says Mr. Hunter, 'an important difference between death from mortification, and any other cause. A dead man, or a limb cut from a living man, may be injected; but in a mortified part we can neither discover blood vessels, muscles, nor cellular membrane. The whole has one uniform white leathery appearance.' It is true the same physiologist observes that the coagulation of the blood, in some cases, is so much higher than the mortification has extended, that it can only arise from a preparatory step to mortification itself. But it does not appear probable that the disposition to mortification should extend so far as to bring the neighbouring vessels into action, and yet cease without mortification actually following. In the case from Mr. Hunter, above referred to, the patient died before the disease could extend so far. We have other instances of a preparatory action marking the future progress of a disease; but, I believe, in all such cases, the disease itself never fails to follow.

"This has been accurately ascertained by Mr. Hunter in cases of morbid poison, even when a disease has been suspended for a time by a remedy; but it may be traced in most of the commonest operations of disease and restoration. I shall instance only one. When matter has formed in any part, however distant from the surface, we are for some time in doubt whether it will make its way to the skin, or be absorbed; but from the time that we see a florid appearance become permanent on the skin, we are satisfied that the matter, however distant, will make its way outward. If, afterwards, we perceive one part of this reddened skin somewhat elongated, and paler than the rest, so as to point, as we usually term it, we are not less certain that the matter will find its first exit at that place; and however inconvenient such a part may be, no endeavours of the surgeon can frustrate the intentions of Nature. Should he even make an artificial opening, the part which pointed will ulcerate as

deep as the abscess, though the contained matter may have been previously evacuated.

“ From this, and many other instances of the kind, it is probable that the disposition to mortification could not have extended so far as to bring the neighbouring vessels into a preparatory action, without mortification itself following. It is indeed difficult to conceive how a part highly inflamed can fail to mortify when suddenly deprived of all the blood that fed it; for this coagulation must have extended to all the minutest branches connected with the tumor, or prove unequal to the intention of Nature.

“ It seems therefore most probable that the blood had coagulated in the sac, and probably in the artery between the sac and the place of pressure. In either case, the artery would contract itself, from the blood no longer passing through it, or being much diminished in quantity. But the constant efforts of the heart and larger arteries might for an instant overcome this pressure in a variety of ways, in which case the blood suddenly entering the contracted artery, would produce pain, either from the sudden change in the situation of the artery, from the neighbouring nerve being affected, or from the blood flowing into the now impervious sac.

“ There are many reasons why the artery above the sac should recover itself, while the sac remains impervious. The first is, that the sac has lost its elasticity. The artery, on the contrary, having contracted upon its contents, is likely to preserve a small diameter. If this is filled with coagulum and the pressure is overcome before that coagulum is firm, or has even taken vessels, the coagulum may readily be forced into the sac and the blood follow, not only because the diameter of the artery may be increased, but because, as in this part the artery sends off few or no branches, its conical figure is with its apex towards the heart. At the same time, the situation of the artery below the sac is very different in this respect, and also in the obstruction which the blood must meet with in passing through the sac, now stuffed with coagulum and deprived of its elasticity.”

Dr. Adams here assigns as a reason for having dwelt so long on this subject, his conviction that, in the case he has related, the pain during the pressure arose from the artery overcoming that pressure. He says it is obvious that the remedy is to increase it; and certainly the success he met with justifies such a conclusion.

“ The advantages an operating surgeon may derive,” says the doctor, “ from such a fact appear to me very numerous. In cases of aneurism the whole operation of cutting, searching for, and tying the artery, which, how much soever simplified by Mr. Hunter’s important improvement, is by no means trifling, may be saved. In cases of bleeding stumps, instead of the uncertain process of tying the artery higher, or even renewing the operation, such an application would promise every success, and be attended with few inconveniences. Since the late improvement in amputation by

Mr. Allanson, the only thing which prevents an immediate union of the parts composing the stump is the ligature.

“ In warm climates the ligature proves the principal danger, from the frequent recurrence of locked-jaw. To lessen this danger, and the great pain that attends the common mode of tying the artery, it has been proposed to dissect the nerve from it. In the few cases that I have seen, where this has been attempted, it has been a matter of doubt with me whether the pain has been much lessened. At the same time the operation has been prolonged, and I have had reason to believe that the artery, thus deprived of the vessels that supported it, has sloughed sooner, so as to endanger a bleeding stump.

“ If such a compressing instrument were applied over the artery of a limb to be amputated, some time before the operation, the surgeon would have known how far he might depend on its having completely stopped the flow of blood, and might perform his operation without embarrassment to himself, almost without uneasiness to his patient, and with the fairest prospect of success. For this purpose, the surgeon, or his assistant, should remain with the patient, and if necessary increase the pressure, till he is satisfied there is no longer any danger of the artery recovering itself. The instrument might be left on after the operation is completed.

“ But most of all, in those unhappy cases of hæmorrhage from wounds, where the surgeon is absent, or called to a variety of cases at the same time, how much preferable would such an instrument be to the tourniquet? Should the wounded vessel be deep-seated, or the hæmorrhage proceed from a number of wounded ones, how dreadful and often how unsuccessful does the attempt prove of taking up the artery. All this, however, and much more, will occur to you. Instead, therefore, of proceeding any further, I ought to ask pardon for having detained you so long. I cannot however omit one small incident to shew still further, how little we need be afraid of the capacity of the vessels to perform their restorative functions, after the obliteration of the large artery. Whilst the fore-finger was incapable of sense or motion, it was scalded with boiling water from a tea-urn. Of this the patient knew nothing but by the evidence of his sight. Such was the case during the vesication, ulceration, and consequent healing of the part, which took place in as short a time as if the finger had received its usual portion of blood.”

The value and importance of Dr. Adams's suggestions on a disease, the treatment of which is yet manifestly defective, will bear us out, in the reader's opinion, for having traced the subject to so great a length in this interesting communication.

CHAP. XII. OF AFFECTIONS OF THE BRAIN FROM EXTERNAL VIOLENCE.

WHEN the brain is *compressed*, a set of symptoms ensue extremely dangerous, though sometimes they do not make their appearance till after a considerable interval. But at whatever time they appear, they are uniformly of the same kind, and are in general as follow: drowsiness, giddiness, and stupefaction, dimness of sight, dilatation of the pupil; and, where the injury done to the head is great, there is commonly a discharge of blood from the eyes, nose, and ears. Sometimes the fractured bone can be discovered through the integuments, at others it cannot. There is an irregular and oppressed pulse, and snoring, or apoplectic stertor in breathing. There is likewise nausea and vomiting, with an involuntary discharge of *fæces* and urine. Among the muscles of the extremities and other parts there is loss of voluntary motion, convulsive tremors in some parts of the body, and palsy in others, especially in that side of the body which is opposite to the injured part of the head.

Some of the milder of these symptoms, as vertigo, stupefaction, and a temporary loss of sensibility, are frequently induced by slight blows upon the head, but commonly soon disappear, either by rest alone, or by the means to be afterwards pointed out. But when any other symptoms ensue, such as dilatation of the pupils, and especially when much blood is discharged from the eyes, nose, and ears, and there is an involuntary discharge of *fæces* and urine, it may be reasonably concluded that compression of the brain is induced.

The cavity of the cranium, in the healthy and natural state, is every-where completely filled by the brain; whatever therefore diminishes that cavity, will produce a compression of the brain.

The causes producing such a diminution may be of various kinds, as, fracture and depression of the bones of the cranium; the forcible introduction of any extraneous body into the cavity of the cranium; effusion of blood, serum, pus, or any other matter; the thickness of the bones of the cranium in certain diseases, as in lues venerea, rickets, or spina ventosa; or water collected in hydrocephalous cases. The first set of causes shall be considered in their order. The four last mentioned belong to the province of the physician, and have been considered in a former part of this work.

SECT. I. Of FRACTURE and DEPRESSION of the CRANIUM producing Compression of the Brain.

FRACTURES of the CRANIUM have been differently distinguished by different authors; but it seems sufficient to divide them into those attended with depression, and those which are not so.

In fracture and depression of the cranium, the treatment ought to be, 1. To discover the situation and extent of the fracture. 2. To obviate the effects of the injury done to the brain, by raising or removing all the depressed parts of the bone. 3. To endeavour to complete the cure by proper dressings, and attention to the after-treatment.

When the teguments corresponding to the injury done to the bone are cut or *lacerated*, and, as is sometimes the case, entirely removed, the state of the fracture is immediately discovered; but when the integuments of the skull remain *entire*, even though the general symptoms of fracture be present, there is sometimes much difficulty in ascertaining it. When, however, any external injury appears, particularly a tumor from a recent contusion, attended by the symptoms already described, there can be no doubt of the existence of a fracture. But it sometimes happens that compression exists without the smallest appearance of tumor. In such cases, the whole head ought to be shaved, when an inflammatory spot may frequently be observed. Sometimes the place of the fracture has been discovered by the patient applying the hand frequently on or near some particular part of the head.

When the symptoms of a compressed brain are evidently marked, no time ought to be lost in setting about an examination of the state of the cranium, wherever appearances point out, or even lead us to conjecture, in what part a fracture may be situated. For this purpose an incision is to be made upon the spot through the integuments to the surface of the bone, which must be sufficiently exposed to admit of a free examination.

Some authors have recommended a crucial incision; others one in form of the letter T; while many advise a considerable part of the integuments to be entirely removed. But as it is more agreeable to the present mode of practice to save as much of the skin as possible, a simple incision is generally preferred, unless the fracture run in different directions, and then the incision must vary accordingly. It will frequently happen, that a considerable part of the integuments must be separated from the skull, in order to obtain a distinct view of the full extent of the fracture; but no part of the integuments is to be entirely removed.

When blood-vessels of any considerable size are divided, either before or in time of the examination, they ought to be allowed to bleed freely, as in no case whatever is the loss of blood attended with more advantage than the present. When, however, it appears that the patient has lost a sufficient quantity, the vessels ought to be secured.

After the integuments have been divided, if the skull be found to be fractured and depressed, the nature of the case is rendered evident; but even where there is no external appearance of fracture, tumor, discoloration; or other injury, if the patient continue to labour under

symptoms of a compressed brain, if the pericranium has been separated from the bone, and especially if the bone has lost its natural appearance, and has acquired a pale white or dusky yellow hue, the trepan ought to be applied without hesitation at the place where these appearances mark the principal seat of the injury.

Again, although no mark either of fracture or of any disease underneath should appear on the outer table of the bone, yet there is a possibility that the inner table may be fractured and depressed. This indeed is not a common occurrence, but it happens probably more frequently than surgeons have been aware of; and where it does happen, the injury done to the brain is as great, and attended with as much danger, as where the whole thickness of the bone is beaten in. The application of the trepan is therefore necessary.

But if, after the application of the trepan, it happens that no mark of injury appears either in the outer or inner table in that part, or in the dura mater below it, and that the symptoms of a compressed brain still continue, a fracture in some other part is to be suspected; or that kind of fracture termed by practitioners *counter fissure*, where the skull is fractured and sometimes depressed on the opposite side to, or at a distance from, the part where the injury was received. This is fortunately not a very frequent occurrence, and has even been doubted by some; but different instances of it have, beyond all question, been found. If therefore the operation of the trepan has been performed, and no fracture is discovered, no extravasation appears on the surface of the brain; and if blood-letting and other means usually employed do not remove the symptoms of compression, the operator is to search for a fracture on some other part. The whole head should again be examined with much accuracy; and, by pressing deliberately but firmly over every part of it, if the smallest degree of sensibility remains, the patient will shew signs of pain, either by moans or by raising his hands, when pressure is made over the fractured part. In this way fractures have been frequently detected, which might otherwise have been concealed.

Having now considered every thing preparatory to the operation of the trepan, we shall next point out the means best adapted for the removal or elevation of a depressed portion of the bone.

The first thing to be done is, after shaving the head, to make an incision as deep as the bone, and directly upon the course of the fracture.

The patient ought to be laid on a table, with a mattress under him, while his head is placed upon a pillow, and secured by an assistant. When the extent of the fracture has been determined, and the bleeding from the incision stopped, the depressed bone is now to be elevated; but previous to this it is necessary to search for detached pieces. Should any be found, they ought to be removed by a pair of forceps adapted to this purpose. By the same instrument any splinters of bone which may have been beaten in may be removed;

but when a part of the bone is beaten in beyond the level of the rest of the cranium, as much of the pericranium is then to be removed by a raspator, Plate I. fig. 13, as will allow the trephine, fig. 14, to be applied; or, if the operator incline, for the sake of dispatch, he may use the trepan, which, however, though more expeditious, is much less safe in the application. The operation indeed may be begun and finished with the trephine, while the trepan may perform the middle and principal part of the work. This part of the work is begun by making a hole with the perforator deep enough to fix the central pin of the trephine, in order to prevent the saw from slipping out of its central course, till it has formed a groove sufficiently deep to be worked steadily in; and then the pin is to be removed. If the bone be thick, the teeth of the saw must be cleaned now and then by the brush (fig. 15) during the perforation, and dipped in oil as often as it is cleaned, which will considerably facilitate the motion, and render it more expeditious; making it at the same time much less disagreeable to the patient, if he possess his senses. That no time may be lost, the operator ought to be provided with two instruments of the same size, or at least to have two heads which can be readily fitted to the same handle.

After having made some progress in the operation, the groove ought to be frequently examined with a tooth-pick, or some such instrument, in order to discover its depth; and if one side happen to be deeper than the other, the operator ought to press more on that side which is shallowest. Precautions are more particularly necessary when the operation is performed upon a part of the skull which is of an unequal thickness, especially after the instrument has passed the diploe. And though it be said by writers in general that the instrument may be worked boldly till it comes at the diploe (which is generally known by the appearance of blood), yet the operator should be upon his guard in this point, examining from time to time if the piece be loose, lest through inadvertency the dura mater be wounded; for in some parts of the skull there is naturally very little diploe, and in old subjects scarcely any. It ought likewise to be remembered, that the skulls of children are very thin. When the piece begins to vacillate, it ought to be snapped off with the forceps (fig. 16), or levator (fig. 17); for the sawing ought by no means to be continued till the bone be cut quite through, otherwise the instrument may plunge in upon the brain, or at least injure the dura mater. If the inner edge of the perforation be left ragged, it is to be smoothed with the lenticular (fig. 18), to prevent it from irritating the dura mater. Particular care is to be taken in using the instrument, lest it should press too much upon the brain.

The next step is to raise the depressed part of the bone with the levator, or to extract the fragments of the bone, grumous blood, or any extraneous body. After this, if there appear reason to apprehend that blood, lymph, or matter, is contained under the dura mater,

it ought to be cautiously opened with a lancet, endeavouring to avoid the blood-vessels running upon it, or lying immediately under it.

When the trepan is to be used on account of a fissure in which the bone will not yield, the instrument should be applied so as to include part of it, if not directly over it, as it is most probable that the extravasated fluid will be found directly under it. And when the fissure is of great extent, it may be proper to make a perforation at each end, if the whole can be conveniently brought into view: and in some cases several perforations may become necessary.

When it is proposed to make several perforations to remove depressed fragments of the bone which are firmly fixed, and having the internal surface larger than the external, or to raise them sufficiently, it is necessary to apply the trepan as near the fractured parts as possible; making the perforations join each other, to prevent the trouble of cutting the intermediate spaces.

When the skull is injured over a suture, and it is not thought advisable to use the trepan, a perforation ought to be made on each side of the suture, especially in young subjects, in whom the dura mater adheres more strongly than in adults; because there cannot be a free communication between the one side and the other, on account of the attachment of that membrane to the suture.

After the elevation of the depressed pieces, or the removal of those which are quite loose, the extraction of extraneous bodies, and the evacuation of extravasated fluids, &c. the fore is to be dressed in the lightest and easiest manner; all that is necessary being to apply a pledget of fine scraped lint, covered with simple ointment, to that part of the dura mater which is laid bare by the trepan, or otherwise; after which the edges of the scalp are to be brought together, or nearly so, and another pledget laid along the whole course of the wound; a piece of fine soft linen is to be laid over all, and the dressings may be retained in their place by a common night-cap applied close to the head, and properly fixed.

The patient may be placed in as easy a *position* in bed as possible, with his head and shoulders elevated a little more than ordinary. If the operation be attended with success, the patient will soon begin to shew favourable symptoms; he will soon shew signs of increasing sensibility, and the original bad symptoms will gradually disappear. After this he ought to be kept as quiet as possible; proper laxatives are to be administered, and such as may be least of a nauseating nature. His food ought to be simple and easy of digestion, and his drink of the most diluent kind. If he complain of the wound being uneasy, an emollient poultice should be immediately applied, and renewed three or four times in the twenty-four hours. By these means there will commonly be a free suppuration from the whole surface of the fore.

Every time the *wound is dressed*, the purulent matter ought to be wiped off from it with a fine warm sponge; and if any degree of

sloughiness take place on the dura mater or parts adjacent, it will then be completely separated. Granulations will begin to form, which will continue to increase till the whole arise to a level with the surface of the cranium. The edges of the sore are now to be dressed with cerate straps, and the rest of it covered with fine soft lint, kept gently pressed on it by the night-cap properly tied. In this way the cure will go on favourably; luxuriance of granulations will commonly be prevented; the parts will cicatrize kindly; and as all the skin has been preserved in making the first incision, the cicatrix will be but little observed.

But things do not always proceed in this favourable manner. Sometimes, in a few hours after the operation, the patient is seized with a kind of restlessness, tossing his arms, and endeavouring to move himself in bed, while the symptoms of a compressed brain remain nearly the same as formerly. In this case, especially if the pulse be quick and strong, the patient ought to be bled freely, as there will be reason to suspect some tendency to inflammation in the brain. Sometimes, though the trepan has been properly applied, the symptoms are not relieved, on account of extravasated fluids collected internally under the dura mater, or between the pia mater and brain, or in the cavity of the ventricles. The danger in these cases will be in proportion to the depth of the collection. Particular attention therefore ought always to be paid to the state of the dura mater after the perforation has been made. If blood be collected below the dura mater, this membrane will be found tense, dark coloured, elastic, and even livid: in which case, an opening becomes absolutely necessary to discharge the extravasated fluid. Gentle scratches are to be made with a scalpel, till a probe or directory can be introduced; upon which the membrane is to be sufficiently divided in a longitudinal, and sometimes even in a crucial direction, till an outlet to the fluid be given.

After the dura mater has been cut in this manner, there is some danger of the brain protruding at the opening; but the danger from this is not equal to the bad effects arising from effused fluids compressing the brain, as we shall have occasion to observe by and by. We find that a troublesome and alarming appearance now and then follows the operation of the trepan; namely, the excrescences called *fungi*, formerly supposed to grow immediately from the surface of the brain, but which, in general, originate from the surface of the dura mater or cut edge of the bone granulating too luxuriantly. We shall presently shew that it often happens that they possess little sensibility; and then it has been the practice to prevent their rising to any great height by touching them frequently with lunar caustic. But some cases occur where their sensibility is so great that they cannot be touched, unless they hang by a small neck; and then a ligature may be put round them, and tightened from time to time till they drop off, which will commonly be in the course of a

few days. It seldom happens, however, that there is any occasion for applying such means for the removal of these tumors, for they generally fall off as the perforations of the bone fill up. If they do not, as the connection between them and the brain will be then in a great measure intercepted, they may be with more safety removed either by excision, by caustic, or by ligature.

The cure being thus far completed, only a small cicatrix will remain, and in general the parts will be nearly as firm as at first, but when much of the integuments have been separated or destroyed, as they are never regenerated, the bone will be left covered only by a thin cuticle, with some small quantity of cellular substance. When this is the case, the person ought to wear a piece of lead or tin, properly fitted and lined with flannel, to protect it from the cold and other external injuries.

This is the method now commonly practised in cases of compression; but it frequently happens, that instead of compression, such a degree of concussion takes place that no assistance from the trepan can be attended with any advantage; for the effects of concussion are totally different from those of compression, and therefore to be removed in a different manner. Before we proceed, however, upon the latter subject, it is incumbent on us to present the reader with some excellent observations on certain points of practice, in cases of compression of the brain, by Mr. Abernethy. That gentleman, in Part III. of his Surgical and Physiological Essays, holds out some important lessons to those who have a strong propensity to employ the trephine upon slight grounds. After relating six cases of recovery under circumstances which would have induced many to resort to the operation, and which, in his opinion, tend to shew, that a slight degree of pressure does not derange the functions of the brain, at least for a *limited time* after its application, Mr. Abernethy says,

“The degree of pressure which the brain can sustain without great injury to the system, probably may vary according to the disposition of that organ to be affected by it, the suddenness of its application, and the direction in which it is made; and although it must be very difficult to obtain any precise knowledge on this subject, yet there is great reason to believe that the brain can bear more pressure without injury to it, than was formerly supposed. The first of these circumstances seems evident; for in some persons a slight pressure produces severe symptoms; whilst in others a much greater degree is borne without inconvenience. Where a compressing cause does not, in the first instance, occasion bad effects, if inflammation of the brain ensues, it seems then to act injuriously; which probably arises from the increased susceptibility of the brain. We can rarely judge of the effects of pressure when any part of the cranium is beaten in by a blow; for in that case the shock generally occasions stupefaction. Internal hæmorrhages, perhaps, afford us the best criterion whereby to determine the effects of pres-

ture on the brain. The seventh case will serve as an illustration of this remark, where it appears that a considerable hæmorrhage must have taken place before it deprived the patient of his faculties; for he walked home, undressed himself, and went to bed, after the trunk of the middle artery of the dura mater had been ruptured. In cases of apoplexy also, the hæmorrhage is generally very large before it produces those consequences which destroy life."

The author mentions a remarkable case of recovery from apoplexy, which occurred to Mr. Wilson's notice.

"A gentleman fell down suddenly, and remained for some time in that lethargic state which is usual in apoplectic cases; but afterwards gradually recovered his faculties both of mind and body, and continued to exercise them very perfectly for two years, when a second attack of the same kind took place, and destroyed him. Upon opening the head, the cause of his death became evident; for a large quantity of blood was found in the ventricles, and at the basis of the cranium. But what seemed particularly worthy of attention, was a cavity in the right hemisphere of the brain, extending from the front to the back part of the cerebrum, being more than four inches in length, and more than an inch in breadth." Within this cavity were contained flakes of coagulated lymph, and a bloody fluid, which were, in all likelihood, the remains of the blood extravasated at the first attack.

"Though a slight degree of pressure," continues Mr. Abernethy, "does not immediately affect the functions of the brain, yet it may act in another way—it may excite inflammation of that organ, as it does of other parts of the body. Its power in this respect, however, will probably lessen by the part becoming accustomed to it; and the cases on record, where fractures with depression have done well, as well as those of recovery from apoplexy, are proofs, that the cause which in the first instance was injurious by its pressure, may continue to exist without inconvenience. Such cases ought surely to deter surgeons from elevating the bone in every instance of slight depression, since by the operation they must inflict a further injury upon their patients, the consequences of which it is impossible to estimate. From all, therefore, that I have learned from books, as well as from the observations I have made in practice, and from reasoning upon the subject, I am disposed to join in opinion with those surgeons who are against trephining in slight depressions of the skull, or small extravasations on the dura mater. In the latter, it is probable the compressing cause will soon be removed by absorption; and in the former, according to the observations of Mr. Hill, and Mr. Latta, the bone will regain its natural level if the subject be young. In adults, however, and especially in persons of advanced life, this circumstance cannot be expected; so that in them the accommodation of the parts to each other, necessary for preventing future

mischief, must be effected by a corresponding diminution of the brain.

"A circumstance, however, frequently occurs, that may render the surgeon doubtful as to what course he ought to pursue; this happens when, at the same time that the skull is slightly depressed, the patient labours under the effects of concussion. The circumstances which generally serve to distinguish those two injuries, will be noticed hereafter. At present it is only necessary to observe, that, as the effects of the latter gradually abate, a little delay will enable the surgeon to decide upon the nature of the mischief, and take his measures accordingly. Where the patient retains his faculties, nothing further is necessary than a continuance of the antiphlogistic plan; and should any disturbance afterwards take place, the same means, employed in a degree proportioned to the urgency of the symptoms, will in most instances be successful without elevating the bone."

This happened in four of the six cases which Mr. Abernethy relates without any view to this particular point.

"But if," says he, "from a peculiar disposition of the brain to be affected by pressure, the disorder of that organ should increase; or if, from inflammation of the brain having taken place, the pressure should then appear to be particularly injurious, the elevation of the bone ought not I think, to be deferred. And from some of the cases related by Mr. O'Halloran, in the fourth volume of the Transactions of the Royal Irish Academy, it appears that this operation, if not too long delayed, will give effectual relief under such circumstances."

In his second Section, Mr. Abernethy treats of injuries of the head which imperiously demand the trephine; namely, those attended with extravasation of blood upon the dura mater. He relates three cases in which the skull was broken, and depressed at the part which covers the *middle artery of the dura mater*, by which means that vessel was *lacerated*. The attention of surgeons, he thinks, has not been sufficiently directed to this event, although the life of the patient might often be saved, if the precise nature of the accident were known, and the bone speedily perforated. These cases, which likewise display, in a very striking manner, some of the effects caused by strong pressure on the brain, we recommend to the reader's attentive perusal, regretting that our limits will only admit of our extracting some parts of Mr. Abernethy's deductions from them.

Mr. Hill, surgeon, in Dumfries, relates a case that occurred, in which the artery of the dura mater was ruptured without either fracture or depression of the skull; and when he trephined a second time, four days after the accident, he found so large a coagulum of blood lying upon that membrane, as to make him afraid of removing it all at once: but on taking out a few ounces of it, the patient, who had hitherto lain in a state of apoplexy, looked up, on being spoken

to, like one awakened from sleep, knew, and named every body, and raised the arm belonging to the opposite side, which had been paralytic from the time of the accident.

"These cases," says Mr. Abernethy, "shew, that a fracture of the skull is not likely to be followed by an equal degree of extravasation in every part, as the vessels connecting the dura mater to the cranium are, in most parts of that membrane, of a small size. If these are accidentally ruptured, a slight hæmorrhage ensues, which soon stops, and only a thin stratum of coagulated blood is found if the bone be removed. But if the fracture happens in the track of the principal artery of the dura mater; if the trunk, or even a considerable branch of that vessel, be torn, the hæmorrhage will be profuse, and the operation of the trephine become immediately necessary to preserve the life of the patient. In the three cases that I have related, the operation was done very shortly after the accident: in the first case, the brain was so compressed that it did not regain its level; in the second, it rose slowly as the blood found its way through the vessels; and in the third, it rose quickly, and the functions of the brain were as quickly restored. It can scarcely be doubted, then, that if the operation had been performed in these cases as soon as it became necessary, when, perhaps, only one instead of many ounces of blood were poured forth from the torn vessel, the lives of the patients might have been preserved.

"It is of great importance to distinguish accurately the nature of such cases; and the distinction is not difficult when there is an interval of sense between the blow and the stupor occasioned by the effused blood. In the first related case, for instance, the nature of the case was made sufficiently evident by this circumstance. But though we are assured that the patient labours under the effects of compression, we cannot, in many instances, know the situation of the compressing cause. In other cases again, where there is no interval of sense after the accident, we are at a loss to determine whether the senseless state be the effect of compression or of concussion. Every surgeon must acknowledge that it would be a very desirable thing to ascertain when blood is effused between the dura mater and the skull; for if the extravasation has happened in the more interior parts, a surgical operation is not likely to afford relief. Now, if the extravasation which compresses the brain be situated immediately beneath the bone, I think there are signs by which it will be disclosed; and as sufficient notice has not been taken of these, I wish particularly to call the attention of surgeons to them."

"If there be so much blood on the dura mater as materially to derange the functions of the brain, the bone, to a certain extent, will no longer receive blood from within; and by the operation performed for its exposure, the pericranium must have been separated from its outside. I believe that a bone so circumstanced *will not be found to bleed*; and I am certain it cannot with the same freedom

and celerity as it does when the dura mater remains connected with it internally. I need hardly say, that in the cases which I have related there was not the least hæmorrhage. But it is right to mention, that I have also twice been able, by attending to the want of hæmorrhage from the outside of the cranium, to ascertain *the extent to which the dura mater was detached within*; and very frequently, when symptoms appeared to demand a perforation of the skull, I have seen it contra-indicated by the hæmorrhage from the bone, and, as the event has proved, rightly.

"When the bone has remained long bare, the case may become perplexing. I once scraped a portion of the cranium which had been some time denuded, and found that it bled in such a manner, as sufficiently to point out the adhesion of the dura mater, and of course the inutility of employing the trephine.

"Where the extravasation on the dura mater is but small, it will probably not require any operation. A slight hæmorrhage from the bone, which may happen from the anastomosing of the vessels within its substance, will not, in this case, lead to any injurious error. But, from what I have observed, I am inclined to believe, that even a small effusion of blood will diminish the hæmorrhage from the superincumbent bone."

Mr. Abernethy, after contending that Mr. Pott's idea, that the bone would perish when the dura mater was detached for any considerable space from its inside, if not incorrect, should at least be received with some qualification, proceeds to enquire into the nature of cases of *fungus* or *hernia cerebri*.

"Their formation," says Mr. Abernethy, "seems to proceed from an injury done to a part of the brain by concussion or contusion, which has terminated in a diseased state of the vessels, similar to what occurs in apoplexy. The morbid state increasing, one or more vessels give way, and an effusion of blood into the substance of the brain ensues, which, if the skull were entire, would probably occasion apoplexy, but, where there is a deficiency of bone that allows it to expand, presses the surface of the brain and its meninges through the vacant space. The dura mater soon ulcerates, and the tumor pushing through the openings, now increases with a rapidity proportioned to that with which the hæmorrhage takes place within. At last, the pia mater, and the stratum of the brain which cover the effused blood, are so extended as to give way, and the blood oozes out and coagulates. Thus the quick growth, and all the other phenomena observable in these tumors, are satisfactorily accounted for.

"It seems probable that similar injuries at other times give rise to the formation of abscesses in the substance of the brain, which are not easily ascertained, and which generally occasion the death of the patient."

On the *plan of treatment* to be adopted Mr. Abernethy offers a few general remarks. He says,

“Where no bad symptoms precede the appearance of the tumor, or where they go entirely away upon its being freed from the confinement of the dura mater, it may, perhaps, be most prudent not to interfere in the treatment of the complaint: for probably the hæmorrhage will cease, and the coagulum will drop off in pieces, or gradually waste away, and be no more renewed. All that appears necessary, then, under such circumstances, is to cover the tumor and fore with some mild dressing, carefully avoiding all pressure, which both reason and experience shew is likely to be attended with bad consequences. Should the bulk of the tumor, however, become inconvenient, or render pressure from the dressings unavoidable, the practice which present experience has shewn to be most successful, consists in occasionally paring off the tumor with a knife. In this manner Mr. Hill treated several cases with success.

“But if the tumor continues to increase, and if the patient suffers a train of bad symptoms, apparently arising from irritation and pressure made on the brain, some further attempt to relieve him seems to be required. Under these circumstances, we have reason to suspect that the coagulum, from want of room to protrude, is enlarging internally; or that by plugging up the orifice in the bone, it prevents the escape of some fluid collected within the cranium. The obvious mode of relief here appears to be, to enlarge the opening in the bone in proportion to the extent and increase of the tumor. Many surgeons have objected to the removal of much of the cranium, lest protrusions of this kind should ensue; but it is evident that these tumors arise from an injury and consequent disease of a part of the brain, the event of which must be more fatal if the bone was entire. A large removal of bone was formerly a frequent event; but a protrusion of this kind very seldom took place.

“But although, by thus allowing a free escape to the effused blood, we may prevent the injurious effects of its pressure on the brain, yet the degree of hæmorrhage may endanger the life of the patient.

“The quantity of blood effused will depend on the magnitude of the vessels, or on their disposition to bleed. As the disease is generally situated not far beneath the surface of the brain, there is less risque of its proceeding from the former cause. If it arises from the latter, it is very likely that the distension caused by the confinement of the effused blood would irritate the vessels, and keep up their disposition to hæmorrhage; therefore the treatment already recommended is likely to diminish it. But should the quantity of the hæmorrhage seem to threaten the life of the patient, I should think it most proper to take away the coagulum, and to expose the cavity in the brain, in order to learn whether suffering some sudden loss of blood to take place, together with the exposure of the bleeding

vessels, might not produce a beneficial change, and a cessation of the hæmorrhage."

Mr. Abernethy's inducement for proposing this plan of treatment is, that no other carries with it a probability of success. There is an impropriety in attempting to restrain the hæmorrhage by pressure; ligatures cannot be applied, and styptics are known to be dangerous in their effects.

"It is obvious, from the nature of the substance of which the tumor is composed, that styptic remedies applied to its surface can have scarcely any effect in lessening its bulk, and none at all in putting a stop to its growth; and experience shews, that the more active of them are not only ineffectual, but highly dangerous."

Good effects, we understand, have resulted from sprinkling these excrescences with the following:

(No. 55.) \mathcal{R} Myrrhæ in pulv. trit.

Lap. Calaminaris præp. sing. unc. ss. Misce fiat pulvis.

In the case of hæmorrhage continuing after the coagulum has been removed, and the vessels exposed, Mr. Abernethy submits whether some of the vegetable astringents diluted, such as infusion of galls, might not be successfully applied to stop the bleeding.

SECT. II. *Of CONCUSSION of the BRAIN.*

By *concussion* of the brain is meant such an injury, from external violence, as either obstructs or destroys its functions, without leaving behind it such marks as to allow its nature to be ascertained by dissection.

Most of the symptoms attending compression of the brain occur also in concussion; but in a compressed state of the brain they are more permanent. There is no discharge of blood from the eyes, nose, or ears, which frequently happens in compression; and instead of that apoplectic stertor in breathing which accompanies compression, the patient seems to be in a sound and natural sleep. The pulse is irregular and slow in compression, and grows stronger and fuller by blood-letting; but in concussion it is weaker, being soft and equal, and sinks by blood-letting. There are besides convulsions in compressions, which are not observed in a state of concussion. The symptoms arising from concussion come on immediately after the injury is received. In the violent degrees of these the patient remains quite insensible; the pupils are much dilated, and do not contract though the eyes be exposed to the strongest light.

In more violent accidents, especially when the patient is rendered insensible; it is extremely difficult to distinguish between concussion and depression; for symptoms which have been supposed to arise en-

tirely from concussion, have, after death, been found to be owing to extravasation or undiscovered fracture; and extravasation has been blamed, when, on dissection, not the least morbid appearance could be discovered.

In concussion the pulse will frequently sink and become feeble, even after the discharge of eight or ten ounces of blood. In doubtful cases, therefore, blood-letting should be practised with great caution. If the pulse become fuller and stronger after discharging a moderate quantity, if the blood appear fizy, and especially if the patient become more sensible, it may be concluded that the symptoms depend upon extravasation, depression of the skull, or some degree of inflammation: and as long as advantage seems to be derived from blood-letting, we may repeat it: but if, upon drawing a few ounces of blood, the pulse become feeble, and especially if along with this the patient become more weakly, we should immediately desist from any further evacuation of blood; and in place of it we ought to give such remedies as may support and strengthen the patient: cordials ought to be given internally, and stimulants applied externally. Warm wine should be given in proportion to the degree of debility induced; the patient, who is apt, in this case, to become cold, should be kept warm by proper coverings; a blister ought to be put to all that part of the head in which the skin has been injured; sinapisms should be applied to the feet; gentle laxatives are useful, and should be regularly given, so as to keep the body open. If the patient cannot swallow wine in sufficient quantity, volatile alkali, ardent spirits, and other cordials of a stimulating kind, it is said, should be given; but of this practice we shall speak presently. In concussions of the brain, Mr. Bromfield has recommended antimonial opiates, and several other practitioners agree with him; though some consider opium as hurtful in the early stages of the disorder, and are of opinion that even wine and other cordials ought to be given with some degree of caution.

Mr. Bromfield's *anodyne sudorific* is the following:
(No. 56.) \mathcal{R} Tinct. Opii drach. ij.

Vin. Antimon. tartar. drach. vj. Misce.

The dose he usually directed is ten drops every four or six hours.

Issues, or the frequent repetition of blisters to the different parts of the head and neck, by which an almost constant stimulus is preserved, are much recommended. When patients are recovering from accidents of this kind, a liberal use of bark, steel, and mineral waters, &c. have sometimes been of service. When the stomach is loaded, gentle vomits become necessary; and white vitriol is reckoned the best in such cases. When much languor, inactivity, and loss of memory, continue, electricity long applied has been attended with advantage. This remedy, however, would be hurtful where any symptoms of compression or inflammation of the brain are present.

On this important subject Mr. Abernethy's observations cannot be passed by. He is of opinion that the effects of concussion have not been justly described by authors, nor the symptoms related by them those which usually occur. He therefore selects two cases out of many others, in order to shew what really are the common consequences of this injury named concussion. The cases are these:

CASE I. " Harriet Silverthorn, aged twenty-three years, slipped down stairs, and struck her occiput against some of the lower steps, by which the integuments were divided about half an inch in length, but the wound was not deep, nor were the surrounding parts much bruised. She was taken up senseless, was bled, and the next morning conveyed to St. Bartholomew's hospital. When brought in she was comatose; could not be made to answer any questions; yet she drew back her arm when pinched, and seemed very uneasy when the wounded parts were pressed upon. Her breathing was without stertor, but performed at some interval, as if she did not wish to inspire until obliged by necessity. The pulse, which was full and labouring, intermitted every fourth or fifth stroke. Eight ounces of blood were immediately taken away, and an opening medicine given, which procured three stools, after which she was ordered a mixture, containing aqua ammoniæ acetatæ, and antimonial wine. The next day (*Friday*) she was rational, put out her tongue when desired, and said she had no pain in her head; her breathing was more regular, and her pulse free from intermission. (*Saturday*), she was still more sensible, and gave some account of herself; complaining now of head-ach, and general uneasiness. The mixture was continued, the purging medicine given again, and a blister laid on between her shoulders. (*Sunday*), her pulse was harder; she was sensible, but restless; complained of pain in her forehead, sat up in bed, and wanted to go home. Six or eight ounces of blood were taken from her temples, and the mixture ordered to be continued as before. (*Monday*), she was much more composed; but as she had still some pain in her head, a blister was applied to it. (*Tuesday*), she had slept quietly during the night, answered rationally, but with quickness, and eagerly desired to go home. As the blisters appeared to have been serviceable, that on her neck was renewed. (*Wednesday*), she was perfectly quiet, and in every respect better; nor had she, after this, any complaint worth mentioning."

CASE II. " A Frenchman, twenty-seven years of age, who had been many years in England, and (as it afterwards appeared) spoke our language perfectly, had met with some accident (but in what manner, I know not), in consequence of which he was brought to the hospital. He was then very comatose, and expressed much uneasiness at being roused from that state; yet he put out his tongue when bid, but did not give a rational answer to questions put to him, and his replies were made in his native language. His pulse was regular, strong, and about 96 in a minute. Ten ounces of

blood were taken from his arm; and after being purged, the common saline mixture, with antimonial powder, was ordered to be given. In the night, he grew delirious, got out of bed, and tore the bandage from his arm; in consequence of which he lost a good deal of blood before it was perceived. This however seemed of use to him; for he became more tranquil after it, and lay quietly dozing till morning. Next day, he was more rational, and complained of pain in his head. When I told him that if he kept quiet, he would soon be well, he said, he hoped so; and appeared solicitous to know what should be done to him. His pulse was only 80, and not strong. A gentle laxative was given, and a blister applied to his head.—On the third day, he was much more sensible, spoke with clearness, and mentioned the pain being in the fore-part of his head; yet, when I asked his age, he told me he was but sixteen years old. *Tuesday* (fourth day), he appeared more excited and wild; his tongue was dry, but his pulse only 75. Nine ounces of blood were taken from the temporal artery. Fifth day, his pulse was only 70, and perfectly natural; yet he had pulled off the dressing from his blisters, and seemed to be very irritable. Sixth day, still pain in his forehead, pulse rather quicker, but tongue not furred. After this, he gradually recovered, without any particular symptom occurring, and without any other medical treatment.”

Mr. Abernethy conceives that, in neither of these cases, had extravasation, at least, to any considerable degree, taken place within the head, since there was no stertor, dilatation of the pupils, or insensibility. He therefore considers them as exhibiting the symptoms which attend *simple concussion*, and reasons upon them in the following way:

“The whole train of symptoms following a concussion of the brain,” says he, “may, I think, be properly divided into three stages. The *first* is, that state of insensibility and derangement of the bodily powers which immediately succeed the accident. While it lasts, the patient scarcely feels any injury that may be inflicted on him. His breathing is difficult, but, in general, without stertor; his pulse intermitting, and his extremities cold. But such a state cannot last long; it goes off gradually, and is succeeded by another, which I consider as the *second* stage of concussion. In this, the pulse and respiration become better, and though not regularly performed, are sufficient to maintain life, and to diffuse warmth over the extreme parts of the body. The feeling of the patient is now so far restored that he is sensible if his skin be pinched; but he lies stupid, and inattentive to slight external impressions. As the effects of concussion diminish, he becomes capable of replying to questions put to him in a loud tone of voice, especially when they refer to his chief suffering at the time, as pain in the head, &c.; otherwise, he answers incoherently, and as if his attention was occupied by something else. As long as the stupor remains, the inflammation of the brain seems to be mo-

derate ; but as the former abates, the latter seldom fails to increase ; and this constitutes the *third* stage, which is the most important of the series of effects proceeding from concussion.

“ These several stages vary considerably in their degree and duration ; but more or less of each will be found to take place in every instance where the brain has been violently shaken. Whether they bear any certain proportion to each other or not, I do not know. Indeed this will depend upon such a variety of circumstances in the constitution, the injury, and the after-treatment, that it must be difficult to determine.

“ With regard to the *treatment of concussion*, it would appear, that in the first stage very little can be done ; and perhaps, what little is done, had better be omitted, as the brain and nerves are probably insensible to any stimulants that can be employed. From a loose, and, I think, fallacious analogy between the insensibility in fainting, and that which occurs in concussion, the more powerful stimulants, such as wine, brandy, and volatile alkali, are commonly had recourse to, as soon as the patient can be got to swallow. The same reasoning which led to the employment of these remedies in the *first* stage, in order to recal sensibility, has given a kind of sanction to their repetition in the *second*, with a view to continue and increase it.

“ But here the practice becomes more pernicious, and less defensible. The circumstance of the brain having so far recovered its powers, as to carry on the animal functions in a degree sufficient to maintain life, is surely a strong argument that it will continue to do so, without the aid of means which probably tend to exhaust parts already weakened, by the violent action they induce.

“ And it seems probable that these stimulating liquors will aggravate that inflammation which must sooner or later ensue. The access of it, in the cases which I have related, is sufficiently evident ; and its cure is to be effected by the common methods. The great benefit of *evacuations* was, in those cases, very evident.”

After some further remarks in opposition to the cordial plan of treatment, and the relation of a fatal case of simple concussion, in which that system would have been manifestly hurtful, Mr. Abernethy adverts to the very desirable object of pointing out the marks by which we may distinguish between compression and concussion of the brain ; for these, he apprehends, may in general be distinguished.

“ As far as my observation goes,” says he, “ the insensibility is much less in concussion, especially after a short time has elapsed. Patients in this case, though they seem reluctant to answer questions, yet complain much if their heads are moved ; and in those instances where it was judged necessary to inspect the bone, I have generally found that they made great complaint during the operation. The pupils also are usually more contracted than in compression of the brain, the muscles of the limbs retain their natural state of tone, and

respiration is performed with little or no stertor*, though the pulse generally intermits in a very considerable degree. In the slighter cases of concussion, the sickness of the patient is often very great.

“ But, in cases of compression of the brain, circumstances very much the reverse of those just related take place; the sensibility is much diminished in proportion to the degree of the injury; from this cause also the pupils are dilated, and the limbs relaxed; the respiration is attended with stertor; and the pulse is subject to much less intermission.”

SECT. III. *Of INFLAMMATION of the MEMBRANES of the BRAIN, or of the Brain itself, from external Violence.*

INFLAMMATION of the BRAIN and of its MEMBRANES is attended with symptoms which occur in inflammation affecting other parts of the body, and from similar causes, and likewise with symptoms peculiar to the brain itself. This disorder differs essentially from concussion, in its not appearing immediately; seldom till several days after the accident, and sometimes not till two, three, or more weeks, or even as many months, have elapsed: when the patient begins to feel an universal uneasiness over his head, attended with listlessness, some degree of pain in the part upon which the injury was inflicted, though of this there was perhaps no previous sensation. These symptoms gradually increase; the patient appears dull and stupid; there is now a sensation of fulness, as if the brain were girt or compressed; he complains of giddiness and of nausea, which sometimes terminate in vomiting; he is hot, and extremely uneasy; his sleep is much disturbed, neither natural sleep nor that procured by opiates affording him relief; the pulse is hard and quick; the face is flushed; the eyes inflamed, and unable to bear an exposure to much light. Sometimes, where a wound of the head accompanies these symptoms, its edges become hard and swelled, and an erysipelatous inflammation spreads quickly over the whole head, and especially towards the forehead and eyelids, which frequently swell to such a degree as to shut up the eyes entirely. This swelling is soft and painful to the touch; it receives the impression of the finger, and frequently originates merely from the external wound; on which account the attending symptoms are commonly easily removed by the means best suited to erysipelas of the parts. In a few instances, however, this symptom is likewise connected with, and seems to originate from, some affection of the dura mater. Its tendency is

* The absence of this symptom, however, must not be relied on as a proof that there is no compression; for Morgagni relates dissections of apoplectic persons, where the effusion was considerable, and yet no stertor occurred. Mr. Abernethy says, he has himself seen cases where it took place only in a very *slight degree*.

then of the most dangerous kind, and therefore requires the greatest attention. Soon after, these symptoms become formidable, the part which received the blow begins to put on a diseased appearance. If the bone has been exposed by the accident, it now loses its natural complexion, becomes pale, white, and dry, either over its whole surface or in particular spots: but when the bone has not been denuded, nor the softer parts divided, but merely contused, they now swell, become puffy, and painful to the touch: and when the head is shaved, the skin over the part affected is redder than the rest of the scalp; and if the swelled part be laid open, the pericranium will probably be found to be detached from the skull, and a little bloody fetid ichor will be observed between this membrane and the bone, which will be found discoloured in nearly the same manner as if it had been laid bare from the beginning.

By the application of proper remedies these symptoms are frequently entirely removed; but when neglected, or when they do not yield to the means employed, they constantly become worse. Delirium ensues; the patient becomes extremely hot: and is at times seized with slight shiverings, which continue to increase, and are attended with some degree of coma or stupor. The former symptoms now, in a great measure, disappear; palsy of one side is soon followed by deep coma; the pupils are dilated; the urine and feces are passed involuntarily; subfultus tendinum and other convulsions ensue; and death certainly follows, if the patient be not speedily relieved.

Of the above symptoms, the first set point out the inflammatory, the other the suppurative, stage of the disease. The remedies which are useful in the one are highly improper in the other. During the inflammatory stage, blood-letting is the principal remedy; but this is improper after the suppurative symptoms appear, for then the trepan is the only thing that can give relief.

The *indications of cure* are; 1. To employ the most effectual means for preventing inflammation. 2. To endeavour to procure the resolution of inflammation by general and topical remedies. 3. When the inflammation cannot be removed by resolution, and when suppuration has taken place, to give a free vent to the matter. 4. If the affected parts be attacked with gangrene, to endeavour to remove it and obviate its effects.

To answer the *first* indication, when the contusion is considerable, *blood-letting*, both general and topical, ought to be employed, and to a considerable extent; the bowels ought to be kept open by the use of laxatives; a watery solution of saccharum saturni should be applied to the part affected, and a low diet, with a total abstinence from exercise, ought to be enjoined: but if these means fail, or, as frequently happens, the practitioner has not been called in soon enough for their proper application, and if inflammation have actually commenced, the second indication ought then to be attended to. For

this purpose, blood-letting, not from the feet according to the advice of old practitioners, but as near as possible to the part affected, is to be performed, by leeching, cupping, or scarifying with a lancet or scalpel.

When instead of this, general blood-letting is thought more advisable, it is commonly reckoned best to open the external jugular vein, or the temporal artery; and the rule, with regard to the quantity to be evacuated, ought to be, to draw blood as long as the pulse continues firm; so that, in violent cases, taking away from 20 to 25 ounces at once will be found to answer the purpose better than to extract even a larger quantity, but at different intervals. A few hours afterwards, if the symptoms continue violent, it may be proper to discharge an additional quantity; but this must depend upon the strength of the patient and the fulness of the pulse.

Along with the liberal use of blood-letting, *brisk purgatives* should be given. The bowels should not merely be kept open; but in order to receive full advantage from the practice, a smart purging should be kept up by repeated doses of calomel, jalap, or some neutral salt. Where the patient cannot swallow in sufficient quantity, stimulating injections should be frequently exhibited.

A moist state of the skin is useful in every case of inflammation, and ought, therefore, to be here particularly attended to. In general a mild perspiration may be induced by applying warm fomentations to the feet and legs, and by laying the patient in blankets instead of linen. But when these means are insufficient, diaphoretics or even sudorifics may be given, particularly Mr. Bromfield's (No. 56.)

When much pain or restlessness takes place, opiates should be administered freely, which are now found to be attended with real advantage.

With respect to the external treatment of this disorder, attention should be paid to those means which may most readily induce a free discharge of purulent matter from the seat of the injury. With this view, if the original accident be attended with a wound or division of the integuments, as the lips of the fore are commonly observed to be hard, painful, and dry, it should be covered with pledgets spread with an emollient ointment, and warm emollient poultices laid over the whole; by which means, and especially by a frequent renewal of the poultices, a free discharge of matter will commonly be induced, and the bad symptoms will generally be much mitigated, or entirely removed.

In cases unattended with a division of the integuments, as soon as it is suspected that bad symptoms may supervene, the tumor should be divided down to the pericranium; and if that membrane be found separated from the bone, it ought likewise to be divided; and by inducing a suppuration in the way already mentioned, the inflammatory symptoms will probably be removed. As matter formed here is commonly of an acrid nature, and therefore apt to affect the bone,

and by communication of vessels the membranes under it, instead of wasting time till fluctuation be distinctly perceived, a free incision should be made as soon as a tumor is observable. But this would be extremely improper in the treatment of tumors which immediately succeed to external injuries; for it often happens that such tumors disappear spontaneously, or by the use of astringent applications. It is only when a tumor attended with pain appears at a distant period upon the spot where the injury was received, that it ought to be opened as soon as perceived.

The next part of the practice regards the remedies to be used when the disorder has either proceeded to suppuration, or when, on a removal of a portion of the cranium, the dura mater is observed to be sloughy, with a tendency to gangrene: and this includes the third and fourth indications of cure.

The suppurative state of the disease is known by the inflammatory symptoms, instead of yielding to the remedies already advised, increasing in violence; and being succeeded by coma, dilatation of the pupils, a slow and full pulse, involuntary discharge of fæces and urine, palsy, and irregular convulsive motions, and especially when these symptoms are succeeded by fits of rigor and shivering.

The existence of matter within the cranium being ascertained, as no other remedy can be depended upon for removing it, the operation of the trepan should be immediately employed, and as many perforations ought to be made as may be sufficient for evacuating the matter. But if, after the skull is perforated, little or no matter appear between the bone and membranes; if the dura mater seem more tense than usual; this membrane is likewise to be opened, so as to give a free discharge to any matter which may be collected between the brain and its membranes.

When it is perceived that the dura mater has already become sloughy, with some tendency to gangrene, the greatest danger is to be dreaded. If mortification has commenced, there will be much reason to think that death will soon follow; but different instances have occurred of sloughs forming upon the dura mater, and of cures being made after these have separated. All that can be attempted is to keep the sores clean, to give a free discharge to the matter, to apply nothing but light easy dressings, and to give bark in as great quantities as the stomach can bear. If there be still some tendency to inflammation, the diet should be low and cooling, the patient should drink freely of whey or other diluent liquors, and the bowels should be kept moderately open: but if, on the contrary, the system be low and the pulse feeble, wine is the most effectual cordial.

Mr. Abernethy gives the following case, as an instance of *inflammation of the pia mater*.

“A man, between thirty and forty years of age, whose head

had been crushed between a cart-wheel and the wall, was admitted into St. Bartholomew's hospital, under the care of Mr. Pitts. The integuments of the cranium, and the upper edge of the temporal muscle, were both torn, and much bruised. The patient was sensible when received into the house. He was immediately bled, and took a purgative medicine. The next day he complained of considerable pain in his head; upon which saline medicines, with antimony, were prescribed. On the third day he was worse; and on the fourth he became delirious and frantic; he frequently endeavoured to get out of bed, and struggled violently when prevented. I now, for the first time, saw the patient, by the desire of Mr. Pitts, who was gone out of town. The progress and symptoms of the complaint clearly shewed that it was an active inflammation of the pia mater. The patient was therefore bled largely, and a blistering-plaster applied over the greater part of his head. The next day he was quieter, and more disposed to coma; but when roused, he was still irrational and impatient. On the following day (the fifth), the coma had increased much; and as the bone was laid bare by the wound, it was thought right to expose it more extensively, in order to see if the state of it indicated the propriety of applying the trephine. I accordingly removed a little of the sloughy temporal muscle, beneath which I found the pericranium naturally adherent. I also scraped the denuded bone, and found that it bled freely in every part. This circumstance contraindicated any operation, and confirmed me in the opinion which I had formed of the disease, viz. that it consisted of active inflammation of the brain, and its membranes. Two days after this the man died. On dissection, the dura mater was found every-where naturally adherent; the pia mater was much inflamed, and a considerable quantity of turbid fluid was collected between these two membranes, and also in the ventricles of the brain."

Mr. Abernethy observes that, in the instance just given of this very frequent disease, the *distinct interval* which occurred between the immediate effects of the injury and the subsequent fatal inflammation, renders the nature of the case particularly clear. Yet this does not always happen; and when it is wanting, the inflammation is apt to be confounded with the immediate effects of concussion of the brain.

"The inflammation of the *dura mater*," says he, "which occasionally succeeds to the injuries of the head, has been well described by Mr. Pott. Patients labouring under this complaint are feverish, have a constrictive pain in the head, but continue rational, and give a clear account of their symptoms, until matter forms, or inflammation of the internal parts ensues. This is what we might naturally expect from the structure of the dura mater, the manner in which it is supplied with blood, and its vessels having little connection with the brain. When the pia mater becomes in-

flamed, as the brain derives a considerable portion of its blood through the vessels of that membrane, the disease is instantly communicated to the cerebrum, and deranges its functions. This derangement varies in its nature and degree, according as the inflammation of the pia mater is more or less violent; as it is confined to the surface, or extends to the internal parts; as it produces a greater or smaller secretion of fluid which compresses the brain; or as it is more or less blended with the effects of concussion. The state of the patient will vary considerably under these different circumstances. If the inflammation be violent and general, the patient will be irrational and disturbed, having his mind strongly affected by wrong ideas, and endeavouring to act in consequence of them. If the inflammation be moderate, and affect the surface only, he will be irrational, uneasy, restless, and perhaps endeavour to get out of bed, but without the violence of mania. Should a moderate inflammation be blended with the effects of concussion, he will have less appearance of irrationality, will lie pretty quiet, and inattentive to slight impressions, as appeared in the cases related.—I am not able to particularise every variety that may occur in the symptoms; but in all, there must be *more or less derangement of the powers, both mental and corporeal*, depending upon the degree of inflammation.—The symptoms, which chiefly characterise the complaint, are those of an increase of sensibility; the pupils of the eyes are contracted; the patient often withdraws his arm on being touched, and his pulse and tongue denote general as well as local inflammation. It seems of the utmost importance, that those means which in general cure inflammation, should be prosecuted very vigorously at the commencement of this complaint, since otherwise, although they may check, they will not overcome it. Large blood-lettings, brisk purging, and extensive counter-irritation by blisters, ought to be employed at the very commencement; for, if omitted, then the disease will become established, and the powers of the body will soon be too much sunk to admit of the same active treatment at a later period.”

“In cases of *tumors* forming within the skull,” says Mr. Abernethy, in conclusion, “it is of consequence to determine *from what part they proceed*. In general, they will be found to spring from the dura mater, and to be the effect of disease in that membrane, induced and kept up by irritation. Surgeons have endeavoured either to reduce them by caustic; to retain them by pressure; or to take them off by ligature or the knife: and the excrescences have either ceased or continued to grow, according as the irritation which gave rise to them has been removed or not. If the former happened, the surgeon has sometimes attributed undeserved merit to the means he had employed for the cure.

“Those tumors which come from *within the dura mater*, may

possibly differ in their kind in different diseases ; but all that I have ever seen were of the same nature, and those have been described."

SECT. IV. Of FISSURES, or *simple* FRACTURES of the SKULL.

The term is here meant to imply a mere division of one or both the tables of the skull, with or without a wound of the integuments, not attended with depression. Fractures of this kind are not dangerous as far as affects the skull only ; for it frequently happens that extensive fissures heal without producing bad symptoms. But as they are frequently attended with effusions of blood or serum upon the brain or its membranes, or as they may tend to excite inflammation in these, they require particular attention.

When effusions occur, symptoms of compression immediately follow. The remedies best suited to this disease must then be applied ; and the trepan is alone to be depended upon. The fissures should be traced through their whole extent, and a perforation made on the most depending part of each of them. If this be unsuccessful, the operation should be repeated along the course of the fissures as long as symptoms of a compressed brain continue ; and as the effused matter will commonly be found contiguous to the fissures, they ought to be included in each perforation.

If the fissure be so large as to produce an obvious separation of the two sides of the bone, the nature of the case will be at once rendered evident ; but where it is extremely small, there is difficulty in distinguishing it from the natural sutures, or from sutures surrounding small bones, which sometimes occur, and get the name of *ossa triquetra*. But this may be known by the firm adhesion which always exists between the pericranium and sutures ; whereas this membrane is always somewhat separated from that part of the bone where a fissure is formed. When the pericranium is separated by the accident for a considerable way from the surface of the bone, various means have been contrived for discovering the nature of the case ; as pouring ink upon the part suspected to be fractured, which in case of a fracture cannot be wiped entirely off ; or making the patient hold a hair or piece of catgut between his teeth, while the other extremity of it is drawn tense, which, when struck, is said to produce a disagreeable sensation in the fractured part. But such tests are little to be depended on ; ink will penetrate the sutures ; and the others are ineffectual, unless the fracture be extensive, and the pieces considerably separated from each other. The oozing of the blood from a fissure is a better mark. The ascertaining of this point, however, appears not very material ; for unless alarming symptoms are present, although there should be a fissure, no operation is necessary ; and if such symptoms occur, the bone ought to be perforated whether there be a fissure or not.

When a fissure is not attended with symptoms of a compressed brain, the trepan ought not to be applied, especially as the operation itself tends, in some degree, to increase inflammation of the part. The fissure should be treated merely as a cause which may induce inflammation. The patient should be bled according to his strength: the bowels should be kept lax, and the fore treated with mild, easy dressing; and violent exertion should be avoided as long as there is any danger of inflammation occurring.

CHAP. XIII. DISEASES OF THE EYES.

SECT. I. *Of the OPTHALMY or INFLAMMATION of the EYES.*

Of the general subject of ophthalmy, and the numerous species into which it has been divided by authors, we spoke under MEDICINE, in our first volume; we shall here resume the subject, as the treatment more properly belongs to Surgery.

Mr. Ware, an excellent writer on the diseases of the eyes, describes the ophthalmy and its causes in the following comprehensive terms:

“The ophthalmy is found in very different degrees. It sometimes occupies only a part of the globe of the eye; but, in common, it extends itself over the whole. It may be superficial, affecting the conjunctiva only; or so deep, as to reach the sclerotica and internal coats. In general, the conjunctiva does not appear to be much thickened: but sometimes its membranous appearance is entirely destroyed, and its projection causes the cornea to appear depressed and sunk in the globe. When the ophthalmy is in this state, it is, for the most part, accompanied with violent pain; and is described, in many books, under the name of chemosis.

“The pain, however, is not always in proportion to the appearance of the ophthalmy. In many cases, where the inflammation seems to be of the slightest kind, the agony is almost insupportable; especially when the eye is exposed to the light: and in some others, where the inflammation appears to be most violent, the uneasiness is so trifling as scarce to be mentioned, though the eye be constantly open and uncovered.

“Whatever the degree of inflammation may be, it will, in general, be found that light is offensive to the eye; and in order to avoid the pain which it occasions, persons, who labour under this complaint, are frequently observed to keep their eyelids shut.”

After condemning the practice of binding up the eyelids to obviate these inconveniences, and for the purpose of applying remedies to them, he recommends the use of a pasteboard bonnet, to be worn at a greater or less distance from the eyes, as the case may require.

"But," continues he, "it must not be supposed that the access of light is the only cause of pain. Instances are common, in which, though the light is excluded, the sufferings of the patient are continual and excessive, from acute pains, which dart through the eye to the back part of the head. This may be the effect of a less, as well as greater, degree of inflammation; and such sensations always indicate much danger of the loss of sight.

"In some cases, the patients constantly imagine that they see black specks, or points, move before the pupil; which symptom is often observed to come on, after the more violent ones are abated. Like the former, it is a frequent forerunner of the gutta serena; and is generally accompanied with such a fixed state of the iris, as renders it incapable of contracting or dilating.

"During the continuance of the inflammation, small *ulcers* are often formed upon the *cornea*, which, being first caused by it, serve afterwards to increase it, and render the cure more difficult. These ulcers generally heal in a depression, which is a great impediment to the sight; causing objects to appear as if they were seen through crinkled glass.

"Small *abscesses* are also sometimes formed between the laminae of the cornea; which, instead of discharging their contents, harden into white opaque specks, and, according to their size, either partially or totally, prevent the entrance of the light. If the specks are superficial, they may wear off in the course of time; but if they penetrate through the whole thickness of the cornea, they do not seem to admit of any remedy.

"These abscesses sometimes burst on the inside of the cornea, and discharge the matter they contain, into the anterior chamber of the aqueous humour, to the bottom of which it descends by its own weight; and here it makes an appearance, like the white speck at the root of the nails, on which account it has been called *onyx*. The matter, thus produced, is usually small in quantity; the solid texture of the cornea naturally indisposing it for a large suppuration.

"Nevertheless it not unfrequently happens, when there is a long continuance of a violent ophthalmia, that the quantity of matter, formed in the anterior chamber, becomes much more considerable, without any perceptible disorder in the above-mentioned coat of the eye; and in this larger collected state, it takes the name of *hypopion*. It is difficult to ascertain, as well the source from which this matter proceeds, as the manner in which it is formed; and it is, at present, needless to enquire into either of them, since they can determine nothing with regard to the mode of treatment.

"Matter sometimes collects also in the posterior chamber of the aqueous humour. It may here either remain in a fluid state, or be inspissated into a solid substance. If it continues fluid, a part of it usually passes through the pupil into the anterior chamber, and falls to the lower margin of the cornea. When it becomes inspissated,

it most commonly forms adhesions, either to the capsule of the crystalline humour, or to the posterior surface of the iris, or to both; and in consequence of these adhesions, the pupil becomes contracted, and its figure is rendered more or less irregular, according to the extent of the adhesion. Sometimes the inspissated matter continues loose, and varies its position in the aqueous humour. In this case, if it be small in quantity it changes its place, according to the direction in which the head is held; and therefore sometimes it passes through the pupil into the anterior chamber. Sometimes, again, the inspissated matter remains fixed in the posterior chamber, and there takes the shape of a membrane; dividing this chamber into two distinct cavities, and answering precisely to the idea entertained by the ancients of the cataract. This membrane often adheres by its circular edge only; the middle part continuing loose and moveable. In such a case, as the adhesion is only partial, the pupil still keeps its figure; and the iris, also, preserves its capacity for motion, though not to the same extent as when there is no adhesion. When the pupil contracts, the adventitious membrane has, in some instances, been observed to protrude through it, but to return to its former and common situation, when the pupil is dilated."

Of the various *causes* that produce the ophthalmy, Mr. Ware speaks in the following terms:

"It frequently," says he, "comes on in the most sudden and unexpected manner, without any preceding or concomitant illness. When it happens in this way, the common people call it a *blast* in the eyes: and, indeed, it seems to proceed from some peculiar property in the air, which surrounds us. Like other epidemical diseases, it often affects a whole neighbourhood at the same time: as was the case during the summer 1778, at Newbury in Berkshire, and in several of the camps, where it was known by the name of the *ocular disease*."

"*Blows* on the eye, according to the force with which they are given, may bring on very different degrees of inflammation. If slight, the effects are, most commonly of short duration; but if violent, a confusion in the coats and humours often takes place, and, in consequence of it, a blindness which appears to be incurable."

"*Wounds* and *punctures* are attended with consequences equally pernicious. Swords, knives, and such-like instruments, generally enter between the globe and orbit, pierce the conjunctiva, wound the cellular membrane that sustains the eye, and if continued onward, penetrate into the brain itself. Wounds thus occasioned produce the most dreadful head-achs, inflammations, abscesses, and sometimes immediate death: but if the mischief is done with needles, pins, or sharp-pointed instruments like them, they are more apt to pierce the globe itself. Hence it often happens, that such punctures are followed with the immediate and total loss of sight."

“ It is not unusual for *blows* on the eye, as well as punctures and small wounds, to produce an extravasation of blood under the tunica conjunctiva. The quantity of blood thus extravasated is sometimes so considerable as to elevate the conjunctiva above the level of the cornea, in the same manner as in the chemosis; and at other times the quantity is so small, as to be no otherwise visible, that by a little redness round the vessel from which it issued. It is here to be noticed, that the appearance of the extravasated blood, though at first red, after a few days, turns dark and livid.”

Mr. Ware adds, that extravasations of this kind may also take place without any external accident; especially in persons of a plethoric habit, and when the weather is hot. “ These,” he says, “ are probably owing to a debility in the vessels of the conjunctiva, which renders them unable to resist the impetus of the rarefied blood. These extravasations, however, never occasion pain, nor any material obstruction to the sight.”

“ *Foreign bodies* entangled in the eye are another common cause of inflammation. These, during their continuance, occasion great pain and an inability to move the lids. They also excite an additional secretion of tears; the flow of which is, in general, sufficient to remove them: but if that fails, the lids must be held open by the fingers, and the patient desired to look towards the side, which is opposite to that wherein the extraneous substance lies; when, if small, it may be wiped off with wet lint on the point of a probe. If there is reason to suppose that more particles than one are in the eye, it may be necessary to send a stream of water over it, by means of a syringe; or to fix an eye-cup on the lids, filled with water, or some other mild liquor. The cup being shaped exactly to the part, will permit the lids to be opened or shut at pleasure, whilst the eye is immersed in the fluid which the cup contains.

“ If there be an adhesion of the extraneous body to the cornea, and that so strong as to resist these attempts to remove it, authors recommend that it be separated with the point of a lancet; which, no doubt, if due care be taken, may be done with perfect safety; but, previous to this, it cannot but be advisable to make use of a thin blunt-pointed scoop, something larger than a common probe; which has this advantage over the lancet, that it will not wound the cornea, and consequently will leave no scar, that might be afterwards an impediment to the sight.”

Where small extraneous particles have insinuated themselves under the upper lid, and adhere to it so closely that none of the means above mentioned will remove them, Mr. Ware directs us to turn the inside of the lid outward by the pressure of the fore-finger and thumb of one hand, applied to the lower edge of the affected lid, whilst a small pressure is at the same time made by a probe held in the other hand, on the outside of the lid, a little above the upper

margin. The foreign particle may then be removed by a little wet lint fixed on the point of a probe.

Small pieces of iron, projected forcibly against the eye, very often stick in the tunica conjunctiva. These may sometimes be very conveniently removed by a load-stone. After continuing there for several days, Mr. Ware has seen a suppuration take place around them, and this has separated their attachment, and caused them to drop out of their own accord. "But, in general," says he, "it must be very unsafe to trust to the operation of nature in such cases; for the continuance of these, or of any substance, in the eye, even for a short time, is likely to bring on inflammations of the most violent and injurious nature."

Mr. Ware enumerates, among the causes of ophthalmia, the small-pox and measles, the venereal disease, and lastly, the *trichiasis*, or inversion of the edges of the eyelids.

The great objects to be aimed at, in the treatment of ophthalmia, are, in the first place, the resolution of the inflammation which has already taken place; and secondly, the removal of those consequences which frequently arise from the inflammation, especially if it have been of long standing. But besides these, while it has appeared, from former observation, that there is a peculiar disposition to the disease, means may often be successfully employed to combat this disposition, and thus prevent the return of the affection.

The ophthalmia membranarum requires the remedies proper for inflammation in general; and when the deeper-seated membranes are affected, and especially when a pyrexia is present, large general bleedings may be necessary. But this last is seldom the case; and, for the most part, the ophthalmia is an affection merely local, accompanied with little or no pyrexia. General bleedings therefore have little effect upon it, and the cure is chiefly to be obtained by topical bleedings, that is, blood drawn from the vessels near the inflamed part. For this purpose Mr. Ware is in the practice of opening the angular vein lying contiguous to the inner canthus; but opening the jugular vein, or the temporary artery, may be considered as in some measure of this kind. Indeed it is commonly sufficient to apply a number of leeches near the eye; but it is perhaps still better to draw blood by cupping and scarifying upon the temples. In many cases, the most effectual remedy is to scarify the internal surface of the inferior eye-lid, and to cut the turgid vessels upon the adnata itself; which Mr. Ware also recommends.

Besides blood-letting, purging, as a remedy suited to inflammation in general, has been considered as peculiarly adapted to inflammation in any part of the head, and therefore to ophthalmia; and it is sometimes useful: but, for the reasons given before with respect to general bleeding, purging, in the case of ophthalmia, does not prove useful in any proportion to the evacuation excited. For relaxing

the spasm in the part, and taking off the determination of the fluids to it, blistering near the part has commonly been found useful. When the inflammation does not yield to the application of blisters after topical bleeding, great benefit is often obtained by supporting a discharge from the blistered part, under the form of an issue, by which means a more permanent determination of blood to that part is obtained.

It is probably also on the same principle that the good effects obtained from the use of errhine medicines in obstinate cases of ophthalmia are to be accounted for. By these errhines, in particular, which occasion and support for some time a great discharge from the nose, great benefit has often been obtained. The powder of asarabacca, or the infusion of hippocastanum, snuffed up the nose at bed-time in proper doses, are often productive of the best effects, when many other remedies have been tried in vain. Mr. Ware has found the following of use in common cases, and in the gutta serena: (No. 57.) \mathcal{R} Hydrargyri vitriolati gran. j.

Pulveris glycyrrhizæ gran. viij. Misce.

He directs one-fourth of this quantity to be snuffed up the nostrils once or twice a-day.

Ophthalmia, as an external inflammation, admits of topical applications. All those, however, which increase the heat and relax the vessels of the part, prove hurtful; and the admission of cool air to the eye, and the application of cooling and astringent medicines, which at the same time do not produce irritation, prove useful. In the cure of this disease, indeed, all irritation must be carefully avoided, particularly that of light; and the only certain means of doing this is by keeping the patient in a very dark chamber; or at least directing him to wear a shade of green silk over the eyebrows, as we have already said is a practice advised by Mr. Ware.

The following collyria from the Pharmacopœia Chirurgica, afford a sufficient variety for the choice of the practitioner in the treatment of this disease:

(No. 58.) \mathcal{R} Calomel. scrup. j.

Aquæ rosæ unc. j. Misce.

A drop or two of this conveyed into the corner of the eye with a camels'-hair pencil (after shaking the vial) has an excellent effect in cooling inflamed eyes, when there is a sense of heat and dryness in them. But whilst this is *occasionally* done, the edges of the eyelid should be lightly brushed over with a pencil smeared with ung. hydrarg. nitrat. and a drop of thebaic tincture also conveyed into the eye, after the manner practised by Mr. Ware, at least once a-day. The same should be done even under the use of other collyria.

(No. 59.) \mathcal{R} Aquæ ammoniæ acetatæ.

Aquæ rosæ sing. unc. j. Misce.

This is a most useful application to inflamed eyes, where there is a high degree of irritation and pain, and will often succeed when other collyria have been ineffectually tried.

In this, as in the application of all fluid remedies to the eye, it is of importance to bring them into *contact* with the part, and even to suffer them to pass between the eye-lids. They are therefore most effectually applied with the assistance of that useful vessel called an *eye-cup*; or, where the more permanent application of the remedy is requisite, single bits of fine linen rag may be dipped into the liquid and laid one over another; the outer pieces being occasionally taken off and dipped afresh as the fluid evaporates.

In some cases, the aqua ammoniæ acetatæ may be used undiluted.

(No. 60.) R. Aquæ distillatæ unc. iv.

Aquæ lithargyri acetati gutt. x. Misce.

(No. 61.) R. Spiritus camphorati gutt. xx.

Aquæ lithargyri acetati gutt. x.

Aquæ distillatæ unc. iv. Misce.

It is necessary to remark, that these ingredients are to be put together in the order here set down, otherwise the camphor will be separated:

(No. 62.) R. Collyrii ammoniæ acetatæ. (No. 59.)

Misturæ camphoratæ sing. unc. ij. Misce.

(No. 63.) R. Collyrii ammoniæ acetatæ unc. iv.

Pulveris cerussæ compositi drach. j. Misce.

(No. 64.) R. Hydrargyri muriati gran. j.

Aquæ distillatæ unc. iv. Misce.

(No. 65.) R. Pulveris cerussæ compositi drach. j.

Aquæ rosæ unc. iv. Misce.

The next is in use at Guy's hospital:

(No. 66.) R. Zinci vitriolati gran. v. ad x.

Aquæ distillatæ unc. iv. Misce.

This is one of the formulæ of St. Bartholomew's hospital:

(No. 67.) R. Zinci vitriolati drach. fs.

Camphoræ gran. vj.

Pulveris radidis iridis gran. x.

Aquæ rosæ unc. vj.

This is one of the formulæ of the Hospital of Invalids at Paris. The three first ingredients are directed to be beaten in a mortar with the white of a hard-boiled egg, but for what purpose it is not easy to understand, as the rose-water is afterwards to be added, and the clear liquor strained off.

The following, from St. Bartholomew's, is perhaps equally good, though much less complex in the preparation:

(No. 68.) R. Zinci vitriolati drach. fs.

Camphoræ gran. x.

Aquæ ferventis unc. vj.

The vitriolated zinc being rubbed with the camphor and the boiling water poured on, the clear liquor is to be separated by filtration.

There are few better collyria than these in which vitriolated zinc forms an ingredient.

(No. 69.) \mathcal{R} Aluminis purificati scrup. j.

Aquæ rosæ unc. vj.

The alum being dissolved in the rose-water makes a good astringent collyrium. It is in use at Guy's hospital.

(No. 70.) \mathcal{R} Cupri vitriolati gr. j.

Aquæ distillatæ unc. iv. Misce.

This resembles the aqua cupri ammoniati in its qualities, and may be weakened or strengthened at pleasure by varying the proportion of vitriolated copper.

(No. 71.) \mathcal{R} Collyrii ammoniæ acetatæ (No. 59.) unc. iv.

Tincturæ opii gutt. xl. Misce.

This is most suitable in an inflamed state of the eye, when the pain is considerable.

(No. 72.) \mathcal{R} Opii in pulverem triti gr. j.

Camphoræ gr. ij.

Aquæ ferventis unc. iv.

The opium and camphor are to be rubbed together, the hot water then added, and the liquor lastly strained through a fine cloth.

This collyrium has very soothing properties, and is suited to those cases of ophthalmia in which there is a peculiar degree of irritability.

Among other remedies, as well for this as for inflammation more immediately affecting the eyelid, Mr. Ware's practice of conveying, once a-day, into the eye, a drop or two of tincture of opium, prepared as directed in the old Dispensatory, is not to be forgotten. This, indeed, is of the greatest service, and sometimes gives immediate relief, after various collyria have been tried in vain. For this reason we shall here give Mr. Ware's account of this valuable remedy in his own words:

"Besides *bleeding* and *blistering*," says he, "some local applications are necessary. I would particularly recommend the thebaic tincture of the old London Dispensatory; a medicine composed of opium and warm aromatics, dissolved in mountain wine. The power of opium, when inwardly taken, to ease pain and induce sleep, has been long known: but its external use is absolutely forbidden by some very respectable persons of the medical profession. Galen relates, that a gladiator was killed by a plaster of opium applied to the head: and other authors have said, that blindness and deafness were caused by its application to the eyes and ears. Experience, however, makes directly against these assertions; and proves, beyond contradiction, the great efficacy of its outward use in a variety of cases. In the ophthalmia, particularly, I have found the thebaic tincture, wherein opium is the principal ingredient, to be eminently serviceable: and the mode in which I applied it, has been to drop one drop of it into the eye, once or twice a-day, according as the symptoms were more or less violent. When first applied, it causes a sharp pain, accompanied with a copious flow of tears,

which continues a few minutes and gradually abates ; after which, a greater and remarkable degree of ease generally succeeds.

“ The inflammation is often visibly abated by only *one application of this tincture* ; and many bad cases have been completely cured by it in less than a fortnight, after every other kind of remedy had been used for weeks, and sometimes months, without any success. But this speedy good effect is not to be expected in all cases indiscriminately. In some, the amendment is more slow and gradual, requiring the tincture to be made use of for a much longer time ; and a few instances have occurred, in which no relief at all was obtained from its first application. In cases of the latter kind, in which the complaint is generally recent, the eyes appear shining and glossy, and feel exquisite pain from the rays of light. However, notwithstanding these symptoms, the application is sometimes found to succeed ; and whether it will or not, can only be determined by making the trial ; which is attended with no other inconvenience than the momentary pain it gives. When it is found to produce no good effect, the use of it must be suspended, until evacuations, and other proper means, have diminished the excessive irritation ; after which, it may again be applied, and bids equally fair for success, as in those instances in which it never disagreed.”

Here the author observes, by the way, that if two or three drops of the thebaic tincture are dropped at once on the globe of the eye, the pain they occasion will be considerably greater than if they are placed *in the inner angle of the eye-lid* and made to glide gradually on the eye, by gently drawing down the lower lid. At the same time that this latter mode of applying the tincture is much less painful than the former, he tells us he has found it equally beneficial.

“ Though I have said,” continues Mr. Ware, “ that opium is the basis of the thebaic tincture, it is yet necessary to observe, that the manner in which it is here prepared is that on which its efficacy not a little depends. I have several times applied a strong solution of opium in water without any success. The pain, indeed, was sometimes lessened for a while, but the inflammation always remained in its full force, as if nothing had been done. A fomentation made with poppy-heads, and applied warm, has been found comfortable to the diseased part ; and, in slight attacks of this disorder, has been sufficient to remove it : but, in more obstinate cases, it has repeatedly been found ineffectual, until the tincture itself was used.

“ That I might judge still more certainly what it was in the thebaic tincture which chiefly caused its utility, I have also occasionally made the experiment of the sole application of the other principal ingredient, which is mountain wine. But this I found, while it produced a still stronger irritation in the eye, and of much longer continuance than the tincture, was seldom followed with any kind of benefit.

"Having thus satisfied myself, that neither of the ingredients, in their separate state, was able to give the relief which they did when combined in the tincture, I have for a long time past confined myself almost wholly to the use of the latter; and I am warranted, from repeated experience, to recommend it, with the helps and cautions above given, as a most effectual application in every species and stage of the disorder, from the most mild and recent, to the most obstinate and inveterate."

Mr. Ware remarks, however, that "when the ophthalmia is accompanied with a violent pain in the head, as well as in the eye, a strong decoction of poppy heads, applied as a fomentation, has sometimes been joined, with great advantage, to the use of the thebaïc tincture, and of the other remedies that are above recommended. If the habit be much relaxed, a fourth part, a third, or even a half, of brandy, or of spirit of wine, may be added to the fomentation; and after the pain is somewhat abated, compresses, wet with a mixture of equal parts of brandy, verjuice, and water, and sometimes of brandy alone, bound on the eyes during the night, have produced very essential service."

2. In the *ophthalmia tarfi*, the same medicines may be necessary as have been already recommended for the *ophthalmia membranarum*. However, as the *ophthalmia tarfi* may often depend upon an acrimony deposited in the sebaceous glands of the part, so it may require various internal remedies according to the variety of the acrimony in fault: for this we must refer to the consideration of scrophula, syphilis, or other diseases with which the ophthalmia may be connected; and where these shall not be evident, certain remedies more generally adapted to the correction of acrimony, such as mercury, may be employed. In the *ophthalmia tarfi*, it almost constantly happens that some ulcerations are formed on the tarsus. These require the application of ung. hydrarg. nitrat. which alone may sometimes cure the whole affection; and the same may be useful even when the disease depends upon a fault of the whole system.

Both in the *ophthalmia membranarum*, and in the *ophthalmia tarfi*, it is necessary to obviate that glueing together of the eyelids which commonly happens in sleep; and which may be done by insinuating a little lard or any mild unctuous liniment between the eyelids before the patient goes to sleep.

The slighter kinds of inflammation from the dust or the sun, may be removed by fomenting with warm milk and water, adding a small portion of brandy; and by anointing the borders of the eye-lids with *unguentum tutiæ*, or the like, at night, especially when those parts are excoriated and sore. But in bad cases, after the inflammation has yielded a little to evacuations, the *cataplasma aluminis* of the London Pharmacopœia spread on lint, and applied at bed-time, has been found the best external remedy. Before the use of the latter, a

strong solution of vitriolated zinc is prescribed with advantage, or the following :

(No. 73.) ℞ Zinci vitriolati scrup. j.

Adipis suillæ præparatæ unc. fs.

The vitriolated zinc being very finely powdered, is afterwards to be well incorporated with the lard.

(No. 74.) ℞ Zinci usti drach. j.

Unguenti ceræ albæ drach. vj. Misce.

This is the Edinburgh ointment of zinc. At St. Thomas's hospital a similar remedy is employed, under the name of *unguentum ophthalmicum*.

In violent pains it is likewise of service to foment frequently with a decoction of white poppy heads. One of the most common and most disagreeable consequences of ophthalmia, is an obfuscation of the cornea, so far obstructing the passage of light as to diminish or prevent vision. This is sometimes so considerable as to admit of removal by operation : but in slighter cases it may often be removed by the application of different gentle escharotics ; and in this way, with little inconvenience, good effects are often obtained, from gently introducing into the eye, at bed-time, a little calomel, powdered-sugar, or the following liniment :

(No. 75.) ℞ Sacchari conditi } opt. lævig. fing. drach. j.

Offis sepiæ }.

Calomelanos scrup. j.

Mellis rosæ q. f. Misce.

The following ointment, invented by M. Pellier, is recommended by Mr. Bell for the like purposes ;

(No. 76.) ℞ Hydrargyri nitrati rubri,

Lapidis calaminaris præparati fing. drach. ifs.

Lythargyri lævigati drach. j.

Tutæ præparatæ drach. fs.

Hydrargyri sulphurati rubri scrup. j.

Balsami Peruviani gutt. xv.

Adipis suillæ præparatæ unc. ij. Misce.

Or this, which is the *unguentum ad lippitudinem* of St. Thomas's hospital :

(No. 77.) ℞ Ceræ albæ drach. ij.

Adipis suillæ præparatæ drach. vj.

Hydrargyri nitrati rubri optime lævig. drach. j.

Opii in pulverem triti gran. xij. Misce.

Or the following ointment of Dr. de Gravers, which is employed, in such cases, at the Liverpool infirmary.

(No. 78.) ℞ Calcis hydrargyri albæ,

Tutæ præparatæ,

Lapidis calaminaris præparati fing. drach. ij.

Tincturæ benzoës compositæ drach. j.

Adipis suillæ præparatæ drach. iij. Misce.

In cases of less moment :

(No. 79.) ℞ Chryst. tartar. }
Sacchari alb. } optime pulver. a a ʒij. Misce.

In many cases of opacity in the cornea, the cure may be gradually effected by the application of finely powdered glass.

Where means much less active may be thought sufficient ;

(No. 80.) ℞ Æruginis præparatæ grān. iv.

Ammonia muriatæ drach. ss.

Aquæ calcis recentis unc. viij. Misce.

This is the *aqua cupri ammoniati* of the New London Pharmacopœia, but prepared after that of Edinburgh with regard to the manner of introducing the copper. It is useful, when diluted, as a general collyrium also, after the inflammatory stage ; but it is to be observed, that its introduction *into* the eye is indispensably necessary.

The following is employed by Mr. Ware in the purulent ophthalmia to which children are subject :

(No. 81.) ℞ Aquæ cupri vitriolati camphoratæ drach. ij.

Aquæ distillatæ unc. iv. Misce.

Where there is a disposition to frequent returns of this affection, the Peruvian bark is often employed with success in combating it ; more especially if accompanied with a solution of muriated quicksilver in the dose of gr. ʒ twice a-day.

In proof of the efficacy of corrosive sublimate, administered internally, in cases of the ophthalmia accompanied with violent pain, the reader is referred to the seventh case in vol. I. of Mr. Ware's *Chirurgical Observations*, and to the remarks made on the *Intermittent Ophthalmia*, annexed to *Observations on the Epiphora*, &c. published in 1792, by Dilly in the *Poultry*.

By the term *intermittent ophthalmia*, Mr. Ware does not mean an ophthalmia accompanying a regular intermittent fever, but an ophthalmia, the usual symptoms of which intermit and return at regular periods. Instances of the ophthalmia accompanying a regular intermittent fever have rarely occurred. The following, however, is the description of a case of this kind given by Mr. Ware.

"A gentleman put himself under my care," says he, "in July, 1793, on account of a violent inflammation of the left eye, which was accompanied with a small ulceration in the cornea, and an opacity in this tunic which extended nearly over the whole of the pupil. Previous to the attack of the ophthalmia, he had had a regular tertian ague, which, after continuing a long time, had been cured by his taking a large quantity of the *cortex Peruvianus*. He was scarcely recovered from the ague, when the ophthalmia commenced, and it had continued a fortnight before I saw him. At this time the inflammation was so considerable, that it appeared necessary to apply three leeches to the left temple, and afterwards a blister, of the size of half a crown, of the same part. I also scarified the inside of the eye-lids, several successive days, with the point of a lancet ; after

which, by the application of the citrine ointment and thebaic tincture, together with common antiphlogistic remedies, the ophthalmia was greatly diminished; but, before he was quite well, the ague returned with its usual violence. A draught composed of an ounce and a half of the decoction of Peruvnia bark, with a drachm and a half of the tincture, and a drachm of the sal catharticus amarus, was now given him every six hours; and after the second fit, which was more violent than the first, a scruple of the red bark was added to every dose of the decoction, still joining with it a drachm of the sal cathart. amar. and giving it every three hours instead of every six. The citrine ointment and thebaic tincture were daily applied to the eye as before. The third fit of the ague was much less violent than the former; and the inflammation continued to diminish. The fourth fit was still milder than the third; and afterwards he had no return of it. The ophthalmia also, by a continuance in the same mode of treatment, was prevented from returning; the ulceration of the cornea healed; and the opacity of this tunic decreased so rapidly that in a short time the patient recovered a very useful sight."

For mere weakness of the eye, nothing in general answers better than regular cold bathing of the eyes by means of an eye-glass; rubbing the eye-lids occasionally with æther or camphorated spirit of wine.

An interesting account is given by Mr. Ware of a *peculiar species of ophthalmia*, with which we propose to conclude this section. After alluding to those instances where mercurials have been of service in removing considerable opacities in the cornea, and in some, where the opacity has been evidently situated in the capsule of the crystalline humour, he says,

"But, true as this is, it should be remembered, that there is a disease of the eye, whose symptoms in many respects bear a resemblance to those I have last mentioned, but in which the administration of mercury, after repeated trials, has been found to be *evidently injurious*. This is a disease which happily does not often occur. I have seen sufficiently of it, however, to be much alarmed whenever it comes under my notice; and I shall now endeavour to give the reader the best description I am able, both of its symptoms and progress; to which I have great pleasure in being able to add the history of one which received a complete cure.

"A greater or less degree of the ophthalmia sometimes precedes the other symptoms; but more commonly a confusion in the appearance of objects is perceived by the patient before there is any visible inflammation in the tunica conjunctiva; and when this confusion has arisen to so great a degree as to induce the patient to apply for medical assistance, the pupil is found to have lost the power of dilating and contracting, and constantly retains the size which, when in health, it usually has in a moderate degree of light. Shortly after this time a slight opacity becomes perceptible in this aperture; but

the opacity, considered alone, is insufficient to account for the cloudiness and confusion that embarrasses the patient's sight; and sometimes it is of so obscure a kind that it is difficult to determine whether it be in the crystalline or cornea, or in that portion of the aqueous humour that occupies the space between these parts. In this period of the disorder, and, as has been observed above, occasionally sooner, a number of vessels in the tunica conjunctiva become enlarged. The access of light rarely gives pain to the eye; although in general the patient appears to avoid it, his sight being least affected when the eye is in the shade, and when the object he looks at is well illumined. In process of time, if the progress of the disorder be not checked, the colour of the iris takes a greenish aspect, and an adhesion is formed between this tunic and the anterior portion of the capsule of the crystalline humour. In consequence of this, the round figure of the pupil is lost; its edges become jagged and irregular; and, at length, the capsule of the crystalline takes a white colour, and the sight is totally and irrecoverably destroyed.

"Such is the description of a disorder, which, though not common, occurs too frequently to be a matter of indifference. Those who are far advanced in life seem more subject to it than others who are younger; and notwithstanding I have seen it in persons who, in other respects, have enjoyed perfect health, it happens more frequently in those who have experienced much anxiety and vexation.

"For the relief of it, I have not only tried, in its different stages, a great variety of remedies; but I have received information of many that have been prescribed by other surgeons. Mercurial medicines, and all that have a tendency to debilitate the system, have appeared to me to make the disorder worse. My principal dependence has hitherto been on the application of mild stimuli to the eye; to which when the constitution has been weakened either by anxiety, or by any other cause, I have usually joined the administration of internal tonics. Electricity, in a few instances, has been thought to afford benefit; but I have had less experience of its efficacy in this than in some other disorders to which the eye is subject. The application of æther, when mixed with a weak solution of hydrargyrus muriatus, has sometimes appeared to me to be decidedly useful.

"In the instance of an elderly lady who had wholly lost the sight of one eye some years prior to the time of my being consulted, and in a way similar to that which is above mentioned (the pupil being contracted and irregular, and the capsule of the crystalline humour being evidently opaque, and adherent to the iris), and whose other eye began then to be affected in a similar manner (her sight with it being very confused, and misty, and the pupil retaining only a small degree of its contractile power), the application of a lotion, composed after the following prescription, very speedily dissipated the mist, and in a short time enabled her, with help of the glasses she

usually wore, to read in a common newspaper. Three years have now elapsed since the time that this remedy was first used ; and, between that period and the present, the lady has repeatedly been under the necessity of resorting to a similar lotion, and always with equal success :

(No. 82.) R Hydrargyri muriati gr. j.

Acidi muriatici. gutt. x.

Aquæ distillatæ. ℥ss. Misce S. A.

(No. 83.) R Hujus solutionis gutt. xv.

Æther. 3j.

Aquæ rosæ ʒvij.

Misce fiat lotio ; et applicetur paululum ad oculos, ope penicilli, cito post liquoris agitationem, bis vel ter in die.

“ But,” continues the author, “ the case to which I beg leave particularly to direct the attention of the reader, is that which I now proceed to describe. The blindness was here so far advanced, and the success which attended the treatment that was adopted, so far exceeded the expectations that were formed, either by the gentleman who attended the lady with me, or by myself, that I am induced to relate the circumstances which accompanied it with some minuteness.

“ A lady, about 55 years of age, in the year 1787, was attacked with a severe pain in the head, for which, after having used a variety of remedies without success, she was recommended to try the effects of sea air and sea bathing. But she had not been many days on the sea coast, before an inflammation began in both her eyes ; and this rapidly increasing, she soon returned to London for the aid of medical advice. She was here confined to a dark room several weeks ; and when the inflammation abated, she was distressed by the imaginary appearance of a considerable number of black moats or marks (usually called muscæ volitantes), which constantly moved before her eyes. In about six weeks the inflammation was subdued, and the lady recovered her usual sight ; but the muscæ volitantes remained, and were particularly troublesome when the light was strong. She suffered no other inconvenience, however, from her eyes until the year 1793 ; when the left eye became again inflamed, but without giving her pain ; and, in addition to the appearances above described, the sight of this eye became obscured with a thick mist. With a view to remove the inflammation, she was bled with leeches on the temple, had a blister applied to her back, and took some strongly purgative medicines ; after which, by the advice of a gentleman of eminence in the profession, she began to take a solution of the hydrargyrus muriatus (which was given her once or twice every day), and to make use of a yellow snuff, which appears to me to have contained a considerable proportion of the hydrargyrus vitriolatus. At the same time a variety of lotions were applied

in succession to the eyes themselves. These remedies were steadily continued several weeks; but under the use of them, the dimness in the sight of the left eye greatly increased, and at length the patient was unable to distinguish with it any object whatever. The sight of the right eye, which had hitherto continued good, with the exception of the *muscæ volitantes*, began now to be affected, precisely in the same manner in which the other eye had been first attacked. In this period of the disorder, I was first desired to visit the lady; and I met, in consultation, Dr. Grieve of Norfolk-street, and Mr. Thomson, surgeon at Woodford. Many of the blood-vessels of both eyes, and particularly of the left, were at this time much enlarged; but the appearance they made was very different from that of a common ophthalmia; the eyelids as well as the eyes having a peculiarly dry but relaxed look, and both being wholly free from pain. The left cornea had a deeply opaque spot in its inferior part, and a dullness over its whole extent; but the greater part of the pupil was perfectly visible, and the dulness in its appearance was insufficient to account for the total loss of sight in this eye. The right cornea had a similar dull look, but there was no defined opacity on one part more than on another. Both pupils were of the size which they usually have in a moderate light, and did not retain the smallest degree of power to dilate or contract. The near prospect of total blindness had not only much hurt the lady's spirits, but, joined with the weakening power of the medicines she had taken, had produced a considerable degree of general debility. Strengthening remedies * were administered internally; and a lotion composed of æther and a weak solution of *hydrargyrus muriatus*, in the way in which it was mixed in the case last mentioned, was recommended to be applied to both the eyes, three or four times every day. These, however, producing no sensible amendment, were in a short time wholly omitted; and, in their stead, the use of a fume, produced by burning a mixture of three parts of the herb eyebright, and one part of plantain leaves, was adopted; which was applied about five minutes daily to each eye, by means of a machine somewhat similar to that with which the fume of tobacco is injected in disorders of the *primæ viæ*. Internal medicines of all kinds were omitted, during its use, except a cupful of the infusion of eye-bright, which the patient drank every morning fasting. For a short time a small proportion of tobacco was mixed with the eyebright and plantain; but the tobacco was soon left out, being found to stimulate the eyes too powerfully. The immediate effect produced by the

* Among other medicines of this class she took the *extractum pulsatillæ*, vel *anemonis pratensis* of Linnæus, by the particular recommendation of Dr. Grieve. This gentleman had a high opinion of its efficacy in cases of general weakness, and especially in those wherein the sight was affected. In the present instance, although it did no good to the eyes, it seemed to increase the patient's strength and spirits.

fumigation on the eye was that of a mild stimulus, by which means it excited for a short time a considerable flow of tears, but these soon ceased, and afterwards the eye always felt both lighter and easier. It was steadily continued two months before any considerable amendment took place in the patient's sight. The eye, last attacked, was the first to experience a favourable change; and in about four months she distinguished with it large letters. Eight months elapsed before the left eye began to see at all; but in twelve, without any alteration in the mode of treatment, this like the other recovered its perfect sight. The redness of the tunica conjunctiva was now wholly subsided; both the pupils were become clear; and their power to dilate and contract in different degrees of light returned to the state in which they usually are when the eyes are quite well."

SECT. II. *Of WOUNDS of the EYELIDS and EYEBALL.*

In cases of superficial wounds of the eyelids, it will be sufficient to bring the edges of the wounds together and retain them in their place by slips of adhesive plaster: but when a wound is deep, particularly when the tarsus is divided, it will be necessary to employ either the interrupted or the twisted suture, care being taken that the sutures be not carried through the inner membrane of the eyelid, otherwise the eye would be irritated and inflamed. After such an operation, the motion of both eyelids should be prevented, as much as possible, else no union of the divided parts can be obtained. After the sutures are finished, the eyelids should be closed and covered with a pledget of emollient ointment, and over this should be laid a compress of soft lint, and one of a similar nature ought likewise to cover the sound eye: then a napkin should be made to press equally on both eyes, and be properly fixed. Inflammation should be guarded against, or, if already present, it must be removed in the manner directed under the article *ophthalmia*. The sutures may be removed in about three days from their introduction, when the parts will commonly be found reunited.

When a portion of the eyelid is so much destroyed, or perhaps so completely removed, as to prevent the remaining parts from being brought together, without obstructing the motion of the eye, the best method will be to treat it with light easy dressings, trusting to nature for supplying the deficiency.

If the *cornea* be wounded, it will commonly be attended with partial or total blindness. If any of the other parts of the ball be wounded, the danger will generally be in proportion to the extent of the wound. The principal attention ought to be directed to the prevention or removal of inflammation. When pain occurs, it ought to be removed by opiates; and with these a strict antiphlogistic course is to be enjoined.

When the wound is large, and the humours completely evacuated, blindness, with sinking of the eyeball, will almost always be the consequence; but in wounds of small extent, by proper treatment, a cure may be made and the sight preserved.

Dr. Antonio Savaresi, one of the physicians to the French army in Egypt, having written on the cure and prevention of the *endemic ophthalmia* of that country, the following extract, translated from the Italian, was communicated by Dr. Blane to the Editors of the Medical and Physical Journal.

Doctor Savaresi first divides this complaint into the sthenic and asthenic; the one depending on an excess, the other on a defect of tone. The former affects the bulb of the eye; the latter, sometimes the *tarsus*, sometimes the *tunica conjunctiva*.

"In the beginning," says he, "I purge in all the three species, without distinction, with an ounce of magnesia vitriolata.

"The sthenic ophthalmia requires very close and strict attention, inasmuch as the cure depends on the efficiency of the first remedies. In this case, a blister to the nape of the neck, and local bleeding from the temporal or jugular vein, are of great utility, and ought not to be omitted. An hour after the letting of blood, a sensible change in the complaint is perceived, and next day the violent pain of the part and the severe head-ache diminish, or at least cease to torture the patient. This effect is often retarded, and the complaint advances, accompanied with a slight feverishness. In order to stop this, it is necessary to repeat the bleeding and the purges.

"A low diet is prescribed, a decoction of barley with cream of tartar, and a resolving collyrium, composed of opium dissolved in spirit of wine, added to decoction of saffron, which contributes to calm.

"This method of cure should be continued till the swelling of the eyes is diminished, and the eyelids begin to be turned up with a degree of swelling, an appearance which always proceeds from the weakening and relaxation of the vessels. In consequence of this change a saponaceous collyrium is ordered, which consists in a solution of soap in spirit of wine, by the use of which the eye-lids resume their natural situation, and easily open, so that the cornea being now visible is found sometimes red or covered with spots. In the first case, cold water with vinegar is employed with good success; and in the second, recourse is had to the dry collyrium, composed of sugar-candy, alum, and nitre, which destroys the spots in a few days. By means of these topical and internal remedies, a complete cure is effected in the space of a month or two. If the complaint should not be removed in that time, there will be too much reason to despair of a cure.

"With respect to the cure of the second species of ophthalmia, I have applied only a tonic collyrium of white vitriol dissolved in vinegar, water, and proof spirit. This remedy has afforded the ut-

most relief, and has cured the complaint radically in twenty days or a month.

“ Another collyrium made of common salt dissolved in vinegar and water, has served to cure a third species of ophthalmic inflammation, which is more simple, but obstinate like the preceding. In the maritime countries of Italy, I have seen this indisposition cured with baths of sea water.

“ Many praise the application of emollient and resolving cataplasms in all the three species. Observation teaches us that this remedy is noxious, since it relaxes the part, increases the pain, and produces other evils.

“ Such has been the *curative* method which I have used in the military hospitals of Egypt, to save from blindness those unfortunate soldiers who were attacked with this disease, and placed under my care. Of a thousand, or thereabouts, who were affected with this disorder, I had the mortification to see two entirely lose their sight, and some others lose the sight of one eye.”

The *preventive means* are thus described. “ The means I am going to point out,” says he, “ cannot be practised by soldiers, as their necessary duties do not admit of it ; but they may be of assistance to those who have the proper convenience for availing themselves of them.

“ First, exposure to the rays of the sun with the head uncovered should be avoided, and to the humidity of the night without some precaution to shelter oneself from it. In the second place, it is necessary to bathe the eyes twice or thrice a-day with fair water mixed with vinegar or lemon juice, especially when the organ has been irritated by dust, smoke, or any external substance ; and when it has been weakened by too much sunshine or humidity, it ought to be sprinkled with spirituous or other tonic liquors. Finally, it will be advisable to abstain from salted food, and at the same time to maintain suitable perspiration ; to preserve the hair of the head a little long, to avoid exposure to cold after being heated, and to attend to the intestinal evacuations.”

Dr. Savaresi adds, that the success of these simple preservatives has been confirmed by observation and experience : when seasonably practised, they prevent the disorder, and preserve the sight.

SECT. III. *Of the spontaneous DISEASES of the EYELIDS.*

The eyelids are subject to be infested with *tumors* of different kinds, which frequently require the assistance of surgery. The first of these is the hordeolum or sty, which frequently grows on the edge of the eye-lid, and is attended with heat, stiffness, and pain ; and, unless proper means be taken to prevent it, a suppuration is frequently the consequence. It may be considered as a common

abscess seated in an obstructed sebaceous duct or gland. It may generally be removed by discutient applications. Should these prove ineffectual, it ought to be brought to suppurate by a small emollient poultice, when it will commonly heal of itself; but if it do not, it should be opened with the point of a lancet, that the matter may be discharged; and the part may be anointed afterwards with saturnine ointment.

The eyelids are subject to encysted tumors, steatoma, warts, &c. which are to be treated like the same tumors when seated in other parts of the body; only, in extirpating these tumors, should part of the eyelid be removed entirely, no dressings can be applied, as however mild they may be, they would irritate and inflame the ball of the eye. All that can be done, therefore, in such cases, is to lay the lips of the sore as nearly together as possible, and frequently to remove any matter that may form on it.

The *eyelashes* are sometimes so much *inverted* as to rub upon the eye and create much pain and inflammation. Various causes are assigned for this, such as the hairs themselves taking a wrong direction; inversion of the tarsus or cartilage of the eyelid; some cicatrix formed upon the skin of this part after wounds or abscesses; tumors pressing the hairs in upon the eye; and, finally, a relaxation of the external integuments.

The treatment of this disorder must depend much upon a knowledge of the cause. When it is owing to a derangement of the cilia themselves, if they have remained long in this state, it will be extremely difficult to make them recover their proper direction. They ought, therefore, to be pulled out by a pair of forceps, and the part washed with some astringent lotion: and if the new hairs appear to take a similar direction, which is very apt to happen, as soon as they are long enough they ought to be turned back upon the eyelid, and kept there for several days, or even weeks, by adhesive plaster. When the disease proceeds from a contraction of the orbicular muscles, the contracted part may be cut from the inner surface of the eyelid; in which place a cut commonly soon heals. If the cause proceed from a tumor or cicatrix, this must be removed before a cure can be expected; or if it be owing to relaxation of the skin, the parts ought to be bathed with some strong astringent. If this fail, the relaxed skin should be removed, and the part healed by the first intention. Sometimes the cilia of the upper eyelids are turned in consequence of dropical swelling in that place. When this happens, the water is to be evacuated by a few punctures with a lancet; but when such means fail, and when the disease is quite local, if vision be disturbed, a sufficient part of the skin ought to be removed with a scalpel, and a cure made by adhesive plaster or the twisted suture.

On the inversion of the eyelids, Mr. Ware offers the following practical remarks.

“ In the enumeration of the common causes of the ophthalmy,” says he, “ the last-mentioned was an *inversion of the edges of the eyelids*. For an ophthalmy thus produced, a palliative cure may be effected; or, to speak more conformably to the fact, a present and temporary relief may be given to the patient, by taking out the lashes with a forceps, a pair of nippers, or any instrument of the like kind. But while the lids retain this inverted state, no sooner do the hairs grow again, than the disorder will again return; nor can the patient be ever properly said to be cured of the complaint, till the edges of the lids are restored to their natural position, and can be kept in it.

“ It is however necessary, that a distinction be made between an inversion of the upper and lower lid. For though an inversion of either will produce the same effect, yet, in the different lids, it appears to arise from different causes, and, consequently, to require different methods of cure.

“ The upper lid and its ciliary edge, both in motion and at rest, are preserved in their natural situation by the equal, though contrary, actions of the musculus orbicularis, and levator palpebræ superioris. But the lower lid, whose motion is very small in comparison with that of the former, has no muscle correspondent to the levator of the upper; and is preserved in its natural state by the equal action of the orbicular fibres spread over it, and the counteraction of the skin which covers it: in which last respect it differs materially from the upper lid, the skin of which, on the contrary, being always very thin and flaccid, is incapable of any such counteracting power.

“ From the above account, it is manifest, that when the trichiasis affects the upper lid it must be owing to a relaxation of the levator palpebræ superioris, and a contraction of the superior part of the orbicularis; whereas, in the case of a trichiasis affecting the lower lid, it can only arise from a relaxation of the skin, and a contraction of the inferior part of the orbicularis. And as in these two cases the causes of the disorder are very different, so they will of consequence require a very different treatment. In the trichiasis of the lower lid, it will be necessary to increase the counteracting power of the skin which covers that lid, so as to prevent the contraction of the musculus orbicularis: whereas, in the trichiasis of the upper lid, it is plain that the sole object of attention must be, to give an additional stimulus to the levator palpebræ superioris, for the purpose of exciting it to proper action.

“ The trichiasis of the upper lid happens but seldom. But in an instance of this kind, which did occur, an entire cure was produced by an operation hereafter to be described, which was performed by a gentleman of great eminence in his profession, to whom I am indebted for the information.”

The operation is described in a case communicated to Mr. Ware, the particulars of which are as follows :

“ The worst kind of trichiasis,” says the relater, “ which I ever saw, was in a young gentleman about 18 years of age. Previous to my seeing him he had repeatedly undergone the usual discipline of extracting the hairs from the cilia : but when they grew again, they took their usual course towards the tunica conjunctiva ; and by continual irritation of that membrane, gave constant pain, and produced what writers on diseases of the eyes call chemosis, and what gives me the idea of fungous flesh, or of a villous surface, resembling the pile of red velvet. After a variety of treatment, as bleeding, purging, blistering, setons, bark, alteratives, and the use of every other method which the most eminent practitioners, both in physic and surgery, could think of, recourse was had to eye-waters and salves, and the panaceæ of the most celebrated empirics of the time : but all proved ineffectual, and the young gentleman became totally blind.

“ At this period I was consulted, and at the same time was asked if I had any objection to the opinion of a celebrated itinerant oculist, who was at that time in England. I said, certainly not. We accordingly met ; and when we had examined the eye, and heard what had been done, he proposed the taking off a fold of the skin of the superior palpebra. I told him I should not object to his making the attempt, if the gentleman and his father gave their consent : though I own it was my opinion that it would not succeed. At that time I had not considered the case sufficiently, though I intended to do it very critically before we met again. A day for the operation was fixed : but, previous to that, the oculist sent a message to the young gentleman’s father, which discovered the true charlatan, and immediately determined the gentleman not to have any more to do with him. I was again sent for, and, having well considered the case, I freely delivered my sentiments, that the method which had been proposed, did not seem likely to me to be successful, as the fault was not in a superfluity of skin, but in a relaxation of the elevator palpebræ superioris muscle. Having premised this, I recommended and performed the following operation. I made an incision through the integuments of the upper lid, from the inner angle of the eye to the outer ; I then separated the fibres of the orbicularis, so as to denude the expanded fibres of the elevator muscle, as near to their termination in the edge of the lid as possible ; which being done, I applied a small cauterizing iron, adapted to the convexity of the globe of the eye, and made pretty warm by passing it two or three times over the tendino-carnous fibres. My intention in this was to occasion a slight irritation, which I hoped would produce the same effect, - as we frequently observe to happen after burns in different parts of the body, especially in the hands, after which the fingers often contract, and in many instances have remained contracted ever

after. This happy effect took place in the present case : and though the eyelid was kept constantly higher than I could have wished, the trichiasis was cured, the inflammation subsided, and the eye became useful."

"The *trichiasis* of the lower lid is a more common complaint. When it is recent, a cure has sometimes been accomplished, by making a fold in the skin below the inverted lid, to draw its edge from the eye. In some cases, nothing more will be requisite to preserve the fold than to cover it with a piece of sticking-plaster. But at other times, when the plaster cannot be made to fasten, it will be necessary to use an instrument for the purpose, which must be so contrived as to take up a small portion of the skin, and to hang by it on the cheek." Of such an instrument mention is made in the case hereafter related.

"When the disorder is slight," continues Mr. Ware, "the skin may be restored to its natural state by the methods above described. But in more obstinate cases I have generally been obliged, for the same end, to cut off a small transverse portion of the loose skin below the edge of the lid, and afterwards confine the sides of the wound together, by means of two or three sutures ; which has effectually answered the purpose. In the following case these circumstances appear.

"S. S. at about 50 years of age, applied to me, on account of an inflammation in her left eye, which had continued nearly two years ; notwithstanding the use of various medicines and applications, recommended by different persons. On examining into the case, it was evident that the inflammation was caused by an inversion of the lower lid, which occasioned the lashes to rub constantly against the eye. She had, for many years, been subject to convulsive fits, which affected every part of her body ; and the disorder in the eye first came on, after a severe attack of this kind. I immediately applied sticking-plaster to the lid, and continued it down upon the cheek ; by which a fold was made in the skin below the lid ; and this effectually answered my design of keeping out the edge of it, so long as the plaster remained well on the part : but, after trying it for several days, I found that it was very liable to slip ; and that, when this happened, the lid immediately returned to its inverted state. I therefore fixed an instrument, something similar to that contrived by Bartischius, and represented by Heister in his 15th pl. fig. 20, upon the skin below the lid, and let it hang upon the cheek ; which, by its weight, kept the lid from becoming inverted : but as the benefit it produced was only temporary, and the pinching of the skin which was necessary to confine it gave the patient pain, I soon omitted the use of it, and performed the following operation : I first took off a transverse fold of the skin, below the edge of the lid ; and then, by the sutures, confined the sides of the wound close to each other. The day after the operation, the integuments surrounding the eye

were considerably swelled; but the swelling soon subsided, by the use of the aqua saturnina, applied as a fomentation. No difficulty afterwards occurred: the eyelids continued constantly in their natural state; the inflammation of the eye was speedily removed; and the patient became perfectly well.

“ Some time after, the same woman applied again with an inflammation in her right eye, which arose, like the former, from an inversion of the lower lid. The left eye had been quite well ever since the operation. The same was performed on this eye; and, being followed with the fomentation, as before, to reduce the consequent swelling, it as readily effected a perfect cure.

“ There are cases, however, in which none of these methods will be sufficient for the cure: as, where the ciliary edges are not only inverted, but likewise contracted in length.

“ Under these circumstances, relief is to be obtained no other way, but by enlarging the circumference of the ciliary edges. This may be done, either by an incision at the outer angle, or by a complete division of the cartilage, called tarsus, in the middle. The first of these operations is no more than a simple straight incision, which may be made with a sharp-pointed curved bistoury. The last, which is seldom necessary, will also be best performed by the same instrument; only observing, that the point be carefully introduced between the globe and eyelid, and carried below the cartilage, that is, about one-eighth of an inch in the whole; whence it is to be pushed outward in a horizontal direction, till it has cut its way through the lid: the cartilages being thus entirely divided, each portion will recede towards the angles, and a separation be left between them, which will not only take off the complaint for the present, but prevent the possibility of its return in future.”

When the *gaping eye* takes place to any great degree, it is attended not only with much deformity and uneasiness, from a large portion of the lining of the eyelid being turned outwards, but likewise from too much of the eye being exposed. The disorder may arise from an enlargement of the eyeball, from dropical swelling, or from the cicatrix of an old wound or abscess: hence it is frequently produced by the small-pox, burns, or scrophula; but more frequently by a laxity of the part in old age.

When the disorder is induced by an enlargement of the ball of the eye, nothing but a removal of this swelling can be effectual. If from dropical swelling, when this is connected with general anasarca, the affection of the system must first be cured; but if it appear to be local, nothing answers so well as punctures. When it arises from a cicatrix, the skin should be divided, and the effects of inflammation guarded against. If it be owing to inflammation, the antiphlogistic course must be used; when it arises from old age, the eyes ought to be daily bathed with cold water, or some astringent and stimulant solution.

Concretion of the eyelids sometimes arises from a high degree of ophthalmia; in which case the eyelids are not only connected by their edges to each other, but now and then grow to the surface of the eyeball. A cohesion is sometimes observed also in children at birth. When the adhesion is slight, it may in general be removed by the end of a blunt probe; but when it is considerable, a cure can only be effected by a cautious dissection. If the eyelids on one side be sound, they will serve as a guide to direct the incision. The tarsi are carefully to be divided from each other; after which, if there be no other adhesions, the eyelids may be readily opened; but if they adhere to the eye, the operator is gently to pull and separate the eyelids, while the patient is desired to move the eye in the opposite direction. When this is effected, nothing further is necessary than to drop a little oil upon the eye, and cover the eyelids with soft lint spread with some cooling emollient ointment. The oil and ointment are frequently to be repeated, and every precaution taken to prevent inflammation and irritation.

SECT. III. *Of SPECKS, FILMS, or EXCRESCENCES on the EYE.*

Specks are sometimes formed upon the white part of the eye, but more frequently upon the cornea. In the former case they are seldom attended with much inconvenience, but in the latter they are often the cause of partial or total blindness. They are almost universally the consequence of inflammation, and seldom go much deeper than the tunica adnata. Two very different states of the disorder occur: the one from an effusion immediately under the outer layer of the cornea, and in this case the cornea does not appear to be raised; the other takes place from one or more little ulcers, which breaking, leave as many opaque spots in the centre, which are more elevated than the rest of the cornea: and the inconvenience attending either situation must always be in proportion to their extent and degree of opacity, or their vicinity to the pupil. When vision is little affected by them, they need scarcely be considered as an object of surgery; but whenever vision is materially impaired, remedies become necessary, and these should be such as are best suited for removing inflammation, promoting absorption, and restoring tone to the vessels.

Vessels running upon the surface of the eye into the speck are to be divided, and the eye frequently bathed with some refrigerant collyrium. By these means the simplest kind of specks, when recently formed, may generally be removed: but where they have been of long standing, their removal is attended with great difficulty. Where the speck is owing to an effusion of fluids between the layers of the cornea, and where it is not attended with any prominence, local applications are of little advantage, as it is impossible to remove the effused matter without injuring the cornea; but consi-

derable service is derived from the use of such remedies as are most effectual for promoting absorption; and with this view, a gentle long-continued course of mercury, brisk purgatives occasionally, and issues in the neck, are found to be the most effectual remedies.

In the management of specks which are prominent upon the cornea, and where inflammation is removed and the opacity is considerable, if the cornea beneath be found, the removal of the diseased part will leave it transparent and fit for vision. The remedies proper for this purpose are escharotics or the knife. The former are applied in the form of a powder, an ointment, or a wash; and these ought to be very finely prepared, otherwise they will be in danger of irritating and inflaming the eye: and they ought merely to be of such strength as the eye can easily bear.

The applications should be long persisted in and frequently repeated; and to make them still more useful, some of the powders or ointments may be applied evening and morning, and the solution two or three times through the course of the day. To the remedies already mentioned caustic is sometimes preferred. With this the centre of the speck is to be frequently touched, till the patient complain of considerable pain, when pure water is to be applied by a pencil, or by dipping the eye in water, with the eyelids open, till the pain occasioned by the application of the caustic be removed. The eye is then to be covered with compresses moistened in some solution, and this frequently repeated. The caustic may be repeated every second or third day, unless prevented by inflammation. When the surgeon chooses to employ the knife, which frequently may be more effectual, the eye is to be fixed by a speculum (fig. 19), or levator (fig. 20); the tumor is then to be cautiously separated by means of a small knife, and every attention paid to prevent inflammation. These are the methods most likely to be of service; and when properly managed they will frequently remove specks, which otherwise would entirely deprive the patient of the use of the eye; though it is to be regretted that cases frequently occur which baffle art.

A membranous excrescence, called *pterygium*, is frequently found upon the white part of the eye, which often spreads over the cornea so as entirely to destroy vision. It is sometimes owing to external injuries; at other times it arises from a general disease of the system, as lues venerea or scrophula; but inflammation is always the more immediate cause.

By a proper application of the remedies above mentioned, affections of this kind may generally be prevented from becoming formidable; but when the reverse takes place, and excrescences begin to spread over the cornea, other means must be used. When the diseased part is only slightly attached, it may be freely removed by a cut of the knife; but when this cannot be done without difficulty, it is better to destroy the vessels by the extension of which this sub-

stance is chiefly formed. The manner of performing the operation in general is this: the patient being properly seated, the eyelids opened, and the eye secured, the operator, with a small knife, makes a scarification through the whole thickness of the excrescence, entirely round, and at a little distance from the circumference, by which the source of nourishment will be cut off; and, after the bleeding is abated, one or two incisions more may be made, in a similar manner, within the former. Some practitioners raise the excrescence with a needle and ligature before the incision is made; and, in some cases, this may be done with advantage, though not in others.

After the bleeding is over, the part is to be bathed two or three times a-day with a weak saturnine solution; and the operation may be repeated occasionally till the excrescence is removed. In this way the operation commonly proves effectual; but instances sometimes occur where, instead of being useful, it increases the disease. Whenever this happens, a palliative course is the only thing to be tried; and although it will not remove the disorder, it may commonly prevent the excrescence from acquiring any additional size. With this intention it ought to be frequently bathed with the solution last mentioned, and afterwards covered with a cooling ointment. When the disorder cannot even be palliated, when vision is destroyed, and particularly when the pain attending it is severe, there is reason to suspect cancer. In this case the eye ought to be extirpated, otherwise deeper parts may suffer, and the life of the patient be endangered. The method of performing this operation will be afterwards pointed out.

SECT. IV. *Of ABSCESSSES in the GLOBE of the EYE.*

Though inflammation of the eye generally terminates by resolution, instances sometimes occur in which an abscess ensues. This is owing either to improper treatment, or a bad habit of body which counteracts all remedies. The greatest danger attending these complaints is when they are situated on the cornea, as the cicatrix left by them may destroy vision. When deep seated, a purulent matter is sometimes apt to be formed in some of the chambers of the eye, the ball becomes enlarged, the humours are disturbed, and neither the iris, pupil, nor lens, can be distinguished. In some rare cases again, after these appearances have continued some time, the cornea bursts, part or the whole of the humours are evacuated, and the iris protrudes in a thickened distended state. This has now the appearance of an excrescence, which is called *staphiloma*, from a kind of resemblance to a grape. But under this term some authors include all collections like those above described. In most instances the cornea protrudes, but in others the tunica sclerotica or opaque part is affected with partial swellings or protrusions.

While the disease is forming, besides the loss of sight, the patient commonly feels great distress in the eye and head, accompanied by symptoms of fever. When no other distress is experienced than the loss of sight, the swelling is but small, and contains chiefly a watery fluid. In the treatment, as vision is seldom preserved, the principal thing is to abate the pain and remove deformity. There is another kind of abscess in the eye, termed *hypopyon*, where the matter is lodged in the substance of the coats. It is sometimes produced by external injuries, but more frequently from pustules of small-pox. If this termination cannot be prevented by the remedies mentioned when we treated on OPTHALMIA, the matter must be evacuated by an incision into the eye, not regarding the humours, as vision previous to this time is entirely destroyed. The proper part is the cornea, or the most prominent part of the tumor.

A variety of this disorder sometimes, though rarely, happens, where the humours are absorbed; but still the same external appearances are observed. In this case a tumor is formed by a thickening of the coats, especially the iris. The only means of relief is extirpation of the prominent part by the use of the knife. After the contents of the eye have been discharged, the parts are to be covered with a compress moistened with a saturnine solution, and the antiphlogistic course followed till a cure is perfected, or at least inflammation removed. If the ulcers discharge a thin-acrid matter, they may be washed two or three times a-day with a solution of corrosive sublimate, or of vitriolated zinc, &c.

Fungous excrescences, sometimes considered as a cancer of the eye, are apt to form in both these diseases after the matter is evacuated; but they may be prevented from increasing to a considerable size by burnt alum finely powdered, or by touching them occasionally with lunar caustic.

Ulcers on the eye may arise from the same causes which produce ulcers on other parts of the body, as wounds, burns, &c.; or they may arise from a general affection of the constitution, as lues or scrophula; but they are more immediately produced by inflammation. In the treatment, therefore, of such diseases, blood-letting, blistering, laxative and cooling applications, as already described in the case of ophthalmia, are to be employed. When the inflammatory state is removed, their management must be almost the same with that for similar affections in other parts of the body. When the disorder arises from an affection of the system, the primary disease must be attended to before a cure can be performed. With respect to the sores themselves, if acrid matter be discharged, we must have recourse to detergent ointments and washes before a cicatrix can be formed. When these have not the desired effect, and when the sore becomes soft and higher than the rest of the eye, astringent applications are most efficacious. If excrescences be present, these are to be removed by escharotics, or by the knife. In some rare instances,

excreescences of a fungous nature are found to be connected with the interior parts of the eye, and become so prominent as even to rest upon the cheek. When such occur, nothing but the removal of the eye itself can effect a cure.

SECT. V. Of DROPSICAL SWELLINGS of the EYE.

The eye is sometimes enlarged by an *accumulation of the aqueous humour*. The symptoms are, a sense of fulness in the eyeball; by degrees the motions of the eyelids become impeded; vision gradually becomes more and more imperfect, till at last the patient can only distinguish light from darkness. As the disease increases, the ball of the eye becomes greatly enlarged, and at this time the cornea begins to protrude; when, if a puncture be not made, the eye bursts and empties itself. This disease is apt to be confounded with staphyloma. But in the dropsical swelling the patient is always sensible to the effects of light, and the pupil is observed to contract, which does not happen in staphyloma. In the early stages of this disease, vision may be preserved by puncturing the under edge of the cornea, and allowing the aqueous humour to pass out by the anterior chamber; or by puncturing the tunica sclerotica a little behind the iris, by which the fluid will pass out at the posterior chamber. The puncture may be made either with a lancet, pointed knife, or with a very small flat trocar. The eye ought afterwards to be dressed with a compress made moist with a saturnine solution, guarding against excessive inflammation. When the use of the eye is somewhat recovered, tone may be restored to the parts, and a return of the disease as much as possible prevented, by frequently bathing the eye in astringent lotions; but where the cornea is destroyed, the sight cannot be restored: we can then only diminish the size of the eye, and render it somewhat more comfortable to the patient.

Blood may be *effused* into the chambers of the eye from various causes, as in putrid diseases, or in consequence of inflammation, but most frequently from a rupture of the blood-vessels induced by external injury. In whatever way it gets into the eye, it mixes with the aqueous humour, and renders it opaque. It is sometimes taken up by the absorbents; when it happens otherwise, it ought to be discharged by a puncture.

A few instances have occurred where the blood has fallen to the under side of the eye, and remained there without mixing with the aqueous humour. In such a situation it ought to be allowed to remain.

When a puncture is necessary, it is to be made in the same manner as in cases of dropfy of the eye; only the opening may require to be somewhat larger, otherwise the blood may not pass readily out.

After the operation, nothing is necessary but to apply a compress of soft lint, moistened with a weak saturnine solution.

SECT. VI. *Of the PROTRUSION of the EYEBALL beyond its SOCKET.*

The eye may *protrude* in consequence of external violence, or from tumors forming behind it, or on account of some of the ulcers, excrescences, or dropical swellings, already mentioned. When the eye is forced out of its socket by external violence, if the eyeball be not entirely separated from the neighbouring parts, it ought to be freed from any extraneous matter which may adhere to it, and immediately replaced; and if the optic nerve be not quite divided, the use of the eye may be recovered. With a view to prevent or moderate inflammation, every part of the antiphlogistic regimen ought to be strictly adhered to. If the protrusion is occasioned by a tumor, the cure must depend upon the removal of this; and if the disease has advanced so far that the bones are become carious, they must likewise be separated. But more frequently, instead of the bones becoming carious, they assume a gelatinous or rather cartilaginous nature. In such a situation an operation could be of little advantage. The best method to prevent the bones from being so affected is an early performance of the operation.

A few instances have happened of the eye being pushed from its socket by an *enlargement of the lachrymal gland*. When this occurs, if the enlargement be considerable, the structure of the eye will most probably be so much injured that vision will be destroyed; but instances have occurred of this gland, in the enlarged state, having been removed without any injury being done to the eye.

SECT. VII. *Of CANCER of the EYE, and EXTIRPATION of the EYEBALL.*

Scirrhus and cancer may arise from repeated inflammations of the eye, or from staphyloma, or some of the other diseases which frequently attack this organ. The symptoms are, an enlargement, hardness, and protrusion of the ball, with a red fungous appearance, sometimes discharging thick yellow matter, but more frequently a thin acrid ichor. At first there is only a sensation of heat in the tumor; but this gradually increasing, changes at last into darting pains, which likewise shoot through to the opposite side of the head. In this situation blood-letting, opiates, and emollient applications, may alleviate the pain. A hemlock poultice applied to the eye, and a wash of lime-water, with a little opium dissolved in it, and applied every time the poultice is renewed, gives some relief; but although the pain be moderated by these means, it does not prevent the disease

from spreading, nor can any thing else but extirpation produce a radical cure.

After the disease is discovered to be cancerous, the operation should be performed without delay, to prevent the parts in the neighbourhood, as well as the constitution at large, from suffering. In performing the operation, the patient should be placed in a proper light, and the head supported by an assistant. If the eyelids are diseased, they must be separated along with the tumor; but where they are sound, they ought to be carefully preserved; and for this purpose they may be kept out of the way by two levatores held by assistants. When the eyeball protrudes considerably, the operator may lay hold of it with his fingers; but if this be impracticable, a broad ligature should be introduced through the centre of it, that it may be the more readily removed from the orbit. Sometimes it will be necessary to enlarge the opening of the eyelids, by cutting the external angle to allow the eyeball to be more readily removed. The whole of the diseased parts are now to be separated by a knife bent so as to correspond with the sides of the orbit, guarding at the same time against wounding the periosteum or the bones of the orbit, which are commonly extremely thin. The eye being in this manner extirpated, the hemorrhagy from the ocular arteries is to be suppressed by means of agaric, or by a bit of sponge; then over this is to be laid soft lint, with a napkin to cover the whole. After supuration takes place, the dressings are to be removed, when a little lint, applied with an emollient pledget over it, will be sufficient as long as any matter is discharged. After the wound is healed, the deformity may be in some measure obviated by wearing an artificial eye; though it is chiefly in cases where part of the humours of the eye have been evacuated that this can be used with much propriety; for when the orbit is empty the artificial eye sinks too far into it.

SECT. VIII. *Of the CATARACT.*

The ancients, and the more modern writers, had a confused idea of the *seat of the cataract*; different authors placing it in different parts of the eye. It consists of an affection of the crystalline lens or of its capsule, by which the rays of light are prevented from falling upon the retina; and is therefore the same disease with the glaucoma of the ancients. It commonly begins with a dimness of sight; and this generally continues a considerable time before any opacity can be observed in the lens. As the disease advances the opacity becomes sensible, and the patient imagines there are particles of dust or motes upon the eye, or in the air. This opacity gradually increases till the person either becomes entirely blind, or can merely distinguish light from darkness. The disease commonly comes on rapidly, though sometimes its progress is slow and gradual. The

opacity of the lens is found to be nearly in proportion to the degree of blindness the patient is affected with: it gradually changes from a state of transparency to a perfectly white, or light grey colour. In some very rare instances a black cataract is found. Sometimes the disease is confined to a particular spot of the lens, but generally the whole is affected. The consistence also varies, being at one time hard, at another entirely dissolved. When the eye is otherwise sound, the pupil moves according to the degree of light in which it is placed. This disease is seldom attended with pain; sometimes, however, every exposure to light creates uneasiness, owing probably to inflammation in the bottom of the eye. The real cause of cataract is not yet well understood. Numbers of authors consider it as proceeding from a preternatural contraction of the vessels of the lens, arising sometimes from external violence, though more commonly from some internal and occult causes. The disease is distinguished from the gutta serena, by the pupils in the latter being never affected with light, and from no opacity being observed in the lens. It is distinguished from hypopyon, staphyloma, or any other disease in the fore-part of the eye, by the evident marks which these affections produce, as well as by the pain attending their beginning. But it is difficult to determine when the opacity is in the lens or in its capsule. The lens is generally affected; when the capsule is the seat of the disease, it is termed the membranous cataract.

With respect to the *treatment*: if the disease be in the incipient state, mercury, particularly calomel in small doses, has been attended with some advantage. When any degree of inflammation is present, blood-letting and cooling regimen will sometimes be necessary. Electricity, extract. hyoscyami, flammula Jovis, &c. have likewise been extolled; but after these or other remedies have failed, the cure must depend upon a surgical operation. For this purpose two methods are in general use. The first of these, and which was practised for a long time before the other, is called *couching*. It is done with a view to allow the rays of light to fall upon the retina; and it consists in removing the lens from its capsule, and lodging it in some part of the vitreous humour, where it may be away from the axis of the eye, and where it is supposed, in course of time, to dissolve.

The other method is termed *extraction*, where, after an incision has been made in the cornea, the lens is pushed through the pupil, and then entirely removed from the eye. Each of these methods has been much practised, and it is still a matter of doubt to which we ought to give the preference. The next circumstance deserving attention is the time at which the operation for couching or extracting can with most propriety be performed. Formerly it was thought necessary to wait till the lens had a certain degree of consistence, or was become ripe; but no certain marks of fluidity or firmness have been yet discovered; neither indeed is there any ne-

cessity for attending particularly to it, as the operation may be practised in every period of the disease, providing the retina be sound, the iris have the power of contracting, and the cornea be transparent. The proper time for the operation is when the opacity of the lens is so considerable as to prevent the patient from following his ordinary occupation. When this is not the case, or when the patient has the use of one eye, it ought not to be performed, as it is always attended with some degree of risque.

1. When the operation is to be performed, the following is the method of doing it: and first, *of couching the cataract*. To guard as much as possible against the effects of inflammation, the patient should be confined, for several days previous to the operation, to a low regimen; and two or three doses of some cooling laxative should be given at proper intervals. After this he is to be seated with his face towards the light; but sun-shine ought to be avoided. Some, however, prefer a side-light, both on account of the operator and patient. One assistant is to support the head, while others secure the arms. The operator is either to be seated with his elbow resting upon a table; or, which is preferred by some, he ought to stand, resting his arm upon the side of the patient. The eye being fixed by the speculum (fig. 19), or in such manner as to allow the whole of the cornea and a small portion of the sclerotic coat to protrude, a couching needle (fig. 21) is to be held in the right-hand, in the manner of a writing pen, if the left eye be the subject of operation; the ring and little fingers are to be supported upon the cheek or temple of the patient: the needle is to be entered in an horizontal direction through the sclerotic coat, a little below the axis of the eye, and about one-fourth of a line behind the edge of the cornea, so as to get entirely behind the iris. If the needle be of the flat form, the flat side ought to be opposed to the iris, to prevent that substance from being wounded. The point of the needle is to be carried forwards till it be discovered behind the pupil. The operator is now commonly directed to push the point into the lens, and depress it at once to the bottom of the eye; but in this way the lens either bursts through the capsule at an improper place, or it carries the capsule with it, tearing it from the parts to which it is connected. Instead of this, the needle ought first to be pushed into the lens near its under edge, as Dr. Taylor advises, and then carried some way down into the vitreous humour, so as to clear the way for the lens. It is then to be drawn a little back, and carried to the upper part of the capsule, when, by pressing upon it, the lens, if solid, is to be pushed down by one, or, if fluid, by several movements, to the bottom of the vitreous humour. It should then be pushed downwards and outwards, as Mr. Bell directs, so as to leave it in the under and outer side of the eye; where, in case it should rise, the passage of the light would be little obstructed. The needle is then to be withdrawn, the speculum removed, and the eyelids closed; and a com-

prefs soaked in a saturnine solution is to be applied over them. Mr. Pellier's method is to cover each eye with a linen bag half filled with fine wool, applied dry, and fixed to a circular bandage of linen passed round the forehead: the whole is retained by a triangular napkin. The patient is then to be laid in bed, upon his back, with his head very little raised; and to be kept in this situation for about a week in a dark room. Unless he be of a weakly habit, he ought to be bled at the neck, or leeches at the temple, a few hours after the operation. He should be kept upon low diet, and get small doses of opiates frequently repeated. His belly should be kept moderately open by gentle purgatives. The dressings should not be removed till inflammation is at least so far gone that no danger will arise from uncovering the eye, which may generally be about the eighth or tenth day. Sometimes the patient perceives light immediately on the dressings being removed, but more frequently not till some time after.

Upon removing the dressings, if the cataract has again got back to the axis of the eye, a repetition of the operation may become necessary. Some time, however, after the inflammatory symptoms are gone, should be allowed to elapse before any other operation is attempted; for the cataract frequently dissolves, provided the aqueous humour get free access to it. Mr. Pott sometimes, when he found the cataract to be of the mixed kind, did not attempt depression, but contented himself with a free laceration of the capsule; in which cases the lens hardly ever failed of dissolving so entirely as not to leave the smallest vestige of a cataract. When the operation is to be performed upon the right eye, the straight needle must either be used by the left-hand, or the operator must place himself behind the patient. A needle (fig. 22), has been contrived, however, with a large curve, by which the operation may be readily performed with the right-hand, while the surgeon is placed before the patient; only the needle is entered towards the inner, instead of the outer, angle of the eye.

2. The first hint of extracting the lens seems to have been suggested by Mr. Petit, who proposed to open the cornea and extract the lens when it was forced into the anterior chamber of the eye either by external violence or accidentally in couching. At first it was considered as a dangerous operation, and was seldom practised till about the year 1737, when Mr. Daviel proposed and practised extraction in preference to couching. The operation is now performed in the following manner: the patient and operator being placed, and the eye fixed in the same manner as for couching, the speculum, when the operation is to be done upon the left eye, is to be held in the left hand of the operator. It is necessary to make as much pressure as will secure without hurting the eye. Neither ought the cornea to be pressed too near the iris, lest the latter be wounded. The operator now takes the knife (fig. 23), and holds it in the same way

as he does the needle for couching; he then enters the point of it, with the edge undermost, into the cornea about the distance of half a line from its connection with the sclerotic coat, and as high as the centre of the pupil; he is then to pass it across the pupil to the inner angle in an horizontal direction, keeping the edge a little outwards to prevent the iris from being cut; the point is then to be pushed through opposite to where it entered; the under half of the cornea is next to be cut, and at the same distance from the sclerotica with the parts at which the point of the knife went into and came out from the eye.

In cutting the under half of the cornea, the pressure of the speculum upon the eye should be gradually lessened; for if the eye be too much compressed, the aqueous humour, with the cataract and part of the vitreous humour, are apt to be forced suddenly out immediately after the incision is made. The operator then takes a flat probe and raises the flap made in the cornea, while he passes the same instrument, or another probe (fig. 24), rough at the extremity, cautiously through the pupil, to scratch an opening in the capsule of the lens. This being done, the eye should be shaded till the lens be extracted, or the eyelids are to be shut to allow the pupil to be dilated as much as possible; and while in this situation, if a gentle pressure be made upon the eyeball at either the upper or under edge of the orbit, the cataract will pass through the pupil more readily than it can do when the eyelids are open.

If the lens cannot be easily pushed through the opening of the cornea, no violent force should be used, for this would tend much to increase the inflammation. The opening should be enlarged, so as to allow the lens to pass out more freely. When the cataract does not come out entire, or when it is found to adhere to the contiguous parts, the end of a small flat probe, or a scoop (fig. 25), is to be introduced, to remove any detached pieces or adhesions that may be present. The iris sometimes either projects too much into the anterior chamber, or is pushed out through the opening of the cornea. When this happens, it is to be returned to its natural situation by means of the probe already mentioned. Sometimes the opacity is not in the body of the lens, but entirely in the capsule which contains it. The extraction of the lens alone would here answer no useful purpose. Some practitioners attempt to extract, first the lens, and then the capsule, by forceps; others, the lens and capsule entire. Those who have had much practice in this branch of surgery, as Pellier, say they find such a method practicable; but others think it better to trust entirely to time and a cooling regimen for the cure, which, in some instances, has taken place. When the operation is to be performed on the right eye, the operator is either to use the left hand, to take his station behind the patient, or to employ a crooked knife (fig. 26).

After the operation is finished, the eyelids are to be shut, and the same treatment observed as in couching. When the operation suc-

ceeds, the wound in the cornea is generally healed in little more than eight or ten days; but previous to this time, the eye ought not to be examined; and even then it should only be done in a dull light, otherwise it may suffer considerably from the irritation which a strong light might occasion. When the eye is to be examined, if the eyelids be found adhering together, they ought to be washed with some gentle astringent. With this the eye ought also to be frequently washed afterwards, by which it will gradually recover strength and sight. About the end of the third week the dressing may be entirely removed, and a piece of green silk put over the eyes as a shade; and if every thing has succeeded, the patient may generally go out after a month from the time at which the operation was performed.

It sometimes happens, that in extracting the lens a portion of the vitreous humour is evacuated. This does not in general prevent the success of the operation. The eye soon begins to fill again, and in the course of two or three weeks it is for the most part as large as it was previous to the operation. Whether this be owing to a renewal of the vitreous humour, or merely an aqueous secretion, is not yet determined; though the latter circumstance is generally supposed.

3. In the "*Actes de la Société de Médecine à Bruxelles*" are published some interesting reflections on the vacillating cataract; by J. Forlenze, surgeon-oculist at the Hôtel-Dieu, &c.

This disorder (*cataracte branlante*), the author remarks, although it has been noticed by Celsus, and some other of the ancients, is neglected by the moderns, St. Ives alone having treated upon it, and that very slightly.

M. Forlenze gives a case of complete blindness in an elderly person from a gutta serena. The left eye exhibited, on examination, a very peculiar structure, the crystalline lens appearing to range in different directions, with a tremulous motion, according to the positions of the eye itself. This phenomenon had been attributed by St. Ives to an adherence of the iris to the capsule of the crystalline humour; and of the truth of that opinion our author seemed fully convinced in the present case: he therefore resolved to attempt effecting a separation of these two adhering parts, with the view of clearing up the nature of the disease, rather than with the hope of a cure.

The patient being placed in the ordinary position, leaning his head on the bosom of an assistant, who with his two fore-fingers raised up the superior eyelid, Mr. F. kept down the lower lid with his left fore-finger; and, at a moment when the patient was directing his eye outwardly, he plunged the scalpel obliquely, from above downwards and from without inwards, at the distance of a half line from the sclerotica. The incision being then carried forwards to the opposite angle of the eye, at the same distance from the sclerotic coat, a semilunar section was made through the inferior part of the

cornea. At the same instant the operator likewise rested the extremity of his fore-finger upon the globe of the eye, to prevent its yielding, and to afford a point of support against his nail in the act of completing the incision downwards.

For the purpose of extracting the crystalline, Mr. F. employed a golden needle, mounted like the cataract-knife, nineteen lines in length, with cutting edges; flattened in the form of a lancet, and one line in breadth. This instrument, as well as the knife, was held in the manner of a writing pen; and, being conducted under the flap of the cornea, he passed it into the posterior chamber of the eye, moving it in various directions, so as to destroy all the adhesions between the capsule of the crystalline and the iris. These adhesions, he says, were more firm at the inner and upper parts than below. The lens immediately escaped, with its capsule, without applying the smallest degree of pressure. The pupil remained perfect, and there appeared no derangement or dissolution of the vitreous humour, as Maitre Jean pretends will happen in this case.

The slightest compresses and bandages were used. No accident happened till the sixth day, when a trifling ophthalmia supervened: but the event was quite as successful as could have been reasonably expected. The author offers the following reflections:

1. This case confirms the opinion of St. Ives, who thought it was occasioned by an adhesion of the iris with the capsule of the crystalline.

2. It proves that this adherence may be favoured by the immobility of the iris, arising from a palsy of its nerves; whence it follows, that a gutta serena is one of the causes of a vacillating cataract.

3. It appears from the foregoing case, that, in similar, circumstances, relief ought to be attempted; and that it is possible, in destroying the adhesions, to obtain a degree of success which surgeons have not hitherto deemed practicable.

The instruments commonly used for opening the crystalline capsule will, in the above case, prove but a feeble resource for isolating the iris. The needle substituted by M. Forlenze, for the apparatus of Wenzel and of La Faye, is much more simple and convenient.

M. Forlenze, in the same work, gives a curious case of complicated cataract: M. Carbonel, lieutenant-general of the artillery, in the 67th year of his age, had a disease of the left eye with the following complications: 1. A capsular cataract; 2. An adherence to the posterior part of the iris; 3. A liquidity of the crystalline.

The author made a section through the cornea, as in the former case, and extracted the crystalline; but there was so firm an adhesion between the capsule and the posterior part of the iris, that syringing was not effectual, and it was necessary to dissect it off with his needle, assisted by the forceps. He then perceived an opacity

and thickening of the hinder part of the capsule adjoining the membrane of the vitreous humour; which caused extreme difficulty in extracting the whole, and obliged him to cut the remaining portion of it into three pieces with a small pair of scissors. In performing this operation, above half of the vitreous humour escaped, and M. Chopart, who assisted him, thought there could be no hope of success: but the author, having been taught by past experience that the vitreous humour might be regenerated, gave a favourable prognosis. The patient got well, although an ophthalmia supervened, and he at length recovered his sight.

M. Forlenze treated a case of cataract, having its centre opaque and solid, but its circumference liquid and transparent, in the following way:

After making a semilunar section of the cornea, and an incision into the capsule, the liquid part of the crystalline lens escaped; but the central portion, being firm, adhered to the posterior part of the capsule. The adhesion was destroyed by a *curette*; the remaining portion of the lens was then extracted, and a few drops of very pure warm water were injected by means of a curious syringe invented by the author. Some stress is here laid on the use of this syringe and lukewarm water, for the complete extraction of the accompaniments. The author disapproves of M. Anel's syringe, as being too capacious: his own is graduated, and will hold only twelve grains of water.

CHAP. XIV. OF THE FISTULA LACHRYMALIS.

By this disease is properly understood a sinuous ulcer of the lachrymal sac or duct with callous edges; though every obstruction of this passage is commonly called *fistula lachrymalis*.

The first and most simple state of the disease is that termed a *dropsy of the lachrymal sac*. The symptoms are, a tumor between the inner cornea of the eye and the side of the nose. This disappears by pressure, the tears mixed with mucus passing partly into the nose, but chiefly back upon the eye and over the cheek.

This state of the disease is what the French have called the *hernia* or *hydrops sacculi lachrymalis*. It is frequently met with in children who have been ricketty, or are subject to glandular obstructions; and in this state it sometimes remains for several years, subject to little alterations, as the health or habit shall happen to vary, the sacculus being sometimes more, sometimes less dull and troublesome. The contents which are pressed out are sometimes more, sometimes less cloudy; and now and then the disease is attended with a slight ophthalmia, or an inflammation of the eyelids, but which, by common care, is easily removed. If the sacculus be not much dilated, the discharge small, and produced only by pressure, the chief incon-

veniences are the weeping eye, and the gumming together of the lids after sleeping: but these, by being attended to, may be kept from being very troublesome; and if the disease makes no further progress, may be so regulated as to render any more painful process totally unnecessary. If the dilatation be considerable, the swelling is more visible, and the quantity of fluid is larger; it is also in this state more frequently mixed and cloudy, and more troublesome, from the more frequent necessity of emptying the bag: but if the patient be an adult, it may, even in this most dilated state of it, be kept from being very inconvenient.

If an inflammation comes on, the tumor is thereby considerably increased; the discharge is larger, as well during sleep as upon pressure; the skin covering it loses its natural whiteness and softness, becomes hard, and acquires an inflamed redness; and with the tears a mixture of something, which in colour resembles matter, is discharged, especially if the pressure be made with any force, or continued for any time.

When the parts are in this state, the contents of the bag have so much the appearance of purulent matter, that they are now generally considered as such, though Mr. Pott, Mr. Warner, and several others, have been of a different opinion, considering the fluid as merely mucus under a different form; allowing, however, that pus is sometimes discharged. If the puncta lachrymalia be naturally large and open, and the immanation confined to the surface of the sac, its contents will pass off pretty freely, and the skin will remain entire.

But when the skin covering the lachrymal bag has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens that the puncta lachrymalia are affected by it, and the fluid, not having an opportunity of passing off through them, distends the inflamed skin; so that at last it becomes sloughy, bursts externally, and forms an opening in the most prominent part of the tumor, at which the tears and matter contained in it are discharged. When the opening thus formed is small, it commonly heals again in a few days, but it bursts as soon as a considerable quantity of this fluid is collected; and it continues thus to collect and burst alternately, till the opening becomes sufficiently large to prevent any further collection. This state of the disorder exhibits exactly the appearances of a sinuous ulcer, with callous, and sometimes with retorted edges; and this stage forms properly the real fistula lachrymalis. Tears, mucus, and purulent matter, are now abundantly discharged from the fore. When the bone beneath is sound, this discharge is seldom either acrid or offensive to the smell, for the opening being in general in the under part of the tumor, the matter is readily evacuated; but when any of the contiguous parts are carious, they are not only found to be so by the introduction of a probe, but by the appearance, smell, and effects of the matter upon

the neighbouring parts. In this case it is thin, fetid, and commonly so acrid as to fret and corrode the integuments most contiguous to the ulcer; and when the disorder is connected with scrophula or with lues venerea, which is by no means an unfrequent occurrence, the discharge and appearance of the sore will vary according as it happens to be combined with one or other of these diseases.

From what has been said, we may divide this disease into four general heads or states, under which all its more minute distinctions may be comprehended. The *first* consists in a simple dilatation of the sacculus and obstruction of the nasal duct, discharging, upon pressure, a fluid either quite clear or a little cloudy; the skin covering the bag being entire and perfectly free from inflammation. In the *second*, the tumor is somewhat larger; the skin which covers it is in an inflamed state, but entire; and the discharge made through the puncta lachrymalia is of a pale yellow or purulent colour. In the *third*, the skin covering the sacculus is become sloughy, and bursts, by which means the swelling is in some measure lessened: but the matter which, while the skin was entire, used to be pressed out through the puncta lachrymalia, now discharges itself through the new aperture. The ductus ad nares, both in this and the preceding state, are not otherwise diseased than by the thickening of its lining. In the *fourth*, the passage from the sacculus lachrymalis into the nose is totally obliterated, the inside of the former being either ulcerated or filled up with a fungus; and attended sometimes with a caries of the bone underneath.

In the first and most simple state of the disease, viz. that of mere obstruction without inflammation, much pains have been taken to restore the parts to their natural state and use, without making any wound or division at all. The introduction of a probe, the injection of astringent fluids, and a constant compression made on the outside of the sacculus in the corner of the eye, are the principal means by which this has been attempted.

Several years ago, M. Anel made a probe (fig. 27) of so small a size as to be capable of passing from the eyelid into the nose, being introduced at one of the puncta lachrymalia, and passing through the sacculus and duct; with which probe he proposed to break through any small obstruction which might be found in its passage. He also invented a syringe (fig. 28), the pipe of which is small enough to enter one of the puncta, and thus furnishes an opportunity of injecting a liquor into the sacculus and duct; and with these two instruments he pretended to be able to cure the disease whenever it consisted in obstruction merely, and the discharge was not much discoloured. The first of these, viz. the passage of a small probe through the puncta, has a plausible appearance; but will, upon trial, be found very unequal to the task assigned it: the very small size of it, its necessary flexibility, and the very little resistance it is capable of making, are manifest deficiencies in the instrument; the quick sensation in the lining of the sac and duct, and its diseased state, are

great objections on the side of the parts, supposing it were capable of answering any valuable end, which it most certainly is not.

That the passing a fine probe from one of the puncta lachrymalia into the nose is very practicable, we know from experience; but the pain it gives, and the inflammation it often excites, are much greater than any benefit which does or can arise from it. It is said that the principal use of this probe is to clear the little ducts leading from the puncta into the sacculus, and the obstruction of those ducts is often mentioned as a part of the disease. Hence one would be led to suppose that it was a circumstance which frequently occurred; whereas it is seldom, if ever, met with. Nor, even if it did happen, could it ever produce the disease in question; the principal characteristic of which is a discharge into the inner corner of the eye upon pressure made in the angle.

The syringe, if used judiciously while the disease is recent, the sac very little dilated, and the mucus perfectly clear, will sometimes be found serviceable; it gives no pain; and a few trials render the use of it by no means troublesome. There is very little occasion, however, to take much trouble, or to put the patient to so much uneasiness; for if the sac be emptied by compression, if the liquor which was to have been injected be applied to the puncta, they will absorb it as readily as the fluid which naturally passes through them.

Fabricius ab Aquapendente invented an instrument, which was so contrived as by means of a screw to make a pressure externally on the lachrymal bag; from the use of which, he says, his patients received much benefit. This instrument has been considerably improved by later practitioners, and is still recommended as very useful. See Plate II. fig. 30.

All the good that can be obtained by compress and bandage, this screw is capable of procuring; but it is also subject to all the same inconveniences, arising from the impossibility of determining exactly the due degree of pressure: for if it be so great as to bring the sides of the upper part of the sac into contact, all communication between it and the puncta will thereby be stopped; if it be but slight, the accumulation will not be prevented; nor does it in either case contribute to the removal of the obstruction in the nasal duct, the primary and original cause of the disease. If the curative intention were to procure an union of the sides of the sacculus, as in the case of parts separated from each other by the formation of matter or sloughs, and the pressure could be made uniformly and constantly, possibly it might be so managed as to answer a valuable purpose; but as that is not the intention, the pressure, whether made by an instrument or by a common roller and compress, contributes little or nothing towards a cure.

When the disease is only *beginning to form*, if the lachrymal sac be frequently pressed with the finger, the contents of it will be discharged before they become acrid, and the complaint, though seldom to be cured in this manner, may be sometimes endured without any

other assistance. But when the disease has advanced so far as to be in a *state of inflammation*, considerable relief may be obtained from such remedies as are found to be useful in inflammatory affections of other parts of the body, as blood-letting, laxatives, and low diet, together with saturnine applications, to the parts affected. But when these fail, and it is found that the passage of the tears to the nose is completely obstructed, as the matter, if it does not burst outwardly, may be in danger of corroding the bone underneath, a different practice is to be followed.

In this state, an *opening* in the upper part of the sacculus lachrymalis becomes in general absolutely necessary; and as a wound made by a knife leaves a much less disagreeable scar than that which necessarily follows the bursting of the skin, one being a mere simple division, the other a loss of substance; it will always be found best to anticipate the accident of bursting, by making the opening as soon as the integuments are in such a state as to threaten it.

For *making this incision*, authors have been very particular in their directions with regard to its place, manner, and form. But all that the surgeon need observe is, to take care to keep the knife at a proper distance from the juncture of the palpebræ, to begin the incision a very little above a line drawn from that juncture toward the nose, and to continue it downward so as to lay the sac completely open; and the best instrument to make it with is a scalpel of the common form, but of a small size. If the sacculus be already burst, the place of opening is determined; and the orifice may be enlarged with a knife, or dilated.

The incision being made, the contents of the tumor should be moderately pressed out; after which, some practitioners advise that the nasal duct should be searched for by means of a probe; and if found, that a piece of catgut, bougie, or lead, should be introduced, and kept there, its edge being bent a little downwards till the sides of the duct are skinned over and healed. In the mean time, the sore is to be dressed with simple pledgets of wax and oil, which are to be retained by means of adhesive plaster. As soon as the passage of the tears into the nose is sufficiently secured, the substance which has been left in it is to be withdrawn, and the wound healed.

The *last stage* of this disorder is that in which the natural passage from the sacculus to the nose is so diseased as to be quite obliterated, or in which the bones are sometimes found to be carious. The methods hitherto described have all been calculated to preserve the natural passage, and to drive the lachrymal fluid again through it. In this attempt they are sometimes successful; but when every trial for discovering the nasal duct has been unsuccessful, recourse must be had to an artificial opening for the tears. In performing this part of the operation, the patient should be seated opposite to a window, with his head supported by an assistant. The surgeon is to place himself immediately before him, either in a sitting or standing

posture. The canula of the trocar (Plate I. fig. 31) is now to be introduced to the under and back part of the lachrymal sac, and held with one hand, while the stilette is to be passed into it by the other, in a direction obliquely downwards and inwards, between the two spongy bones, till it reach the cavity of the nose, which will be known by some bloody mucus passing out at the nostril. As soon as the instrument has penetrated the nose, the opening should be made sufficiently large; then the stilette should be withdrawn, and a bit of catgut or bougie, or what is more cleanly and convenient, a leaden probe, is to be introduced, and the canula removed. One end of the probe ought to remain in the nose, and the other bent in such a way as to hang over the edge of the wound, and at the same time be in no danger of coming out. The fore is now to be covered with a pledget of lint spread with emollient ointment, and the whole retained with adhesive plaster. The probe must be removed every day or two, so as to allow it and the passage to be cleaned; and at each dressing some astringent injection should be thrown in, when the parts are to be dressed as at first. Several weeks will commonly be necessary for rendering the passage perfectly callous: but this must depend much upon the state of the parts, as well as the constitution of the patient.

After the passage is become sufficiently firm, the dressings and probe are to be withdrawn, and the parts cleared from any mucus with which they may be stuffed. The sides of the wound, now already sufficiently contracted, are to be laid together, and covered with some adhesive plaster. If this be ineffectual, the wound is to be touched with caustic, when the cure will generally be quickly completed. To give tone to the parts, moderate pressure should frequently be made upon the sac, either by the patient's finger or by the machine already mentioned, and this should be continued for a considerable time. Sometimes the disease returns after a cure has been made, owing to diseases of the constitution, carious bone contiguous to the fore, or sometimes to too small an opening having been formed. In this case, a canula of gold, silver, or lead, is sometimes introduced into the artificial passage, and the skin healed over it; by which means the passage will afterwards remain completely open, and no disease of the constitution can ever affect it. We shall describe Mr. Pellier's method of performing this operation, as he made several improvements on it.

The patient is to be seated, and his head properly supported by an assistant; then the sac is to be laid freely open at its inferior part: the nasal duct is to be searched for with a firm probe, or with a conductor (fig. 32), made for the purpose; and Pellier asserts that he never fails of finding it. As soon as this is discovered, a conical tube (fig. 33), with a projection at the top, and another in the middle for securing it in its place, must be put upon the conductor, previously furnished with a compressor (fig. 34), and it should be of

such a size that the conductor may fit it exactly. The point of the conductor is now to be passed into the lachrymal duct; and being pushed in till it reaches the nostril, which may be known either by inserting a probe into it, or by a few drops of blood falling from the nose, the conductor is to be withdrawn; leaving the compressor upon the brim of the canula, which must be firmly pressed down with the left hand, while the conductor is removed with the other. This being done, the compressor must next be taken out; and to discover whether the canula be at a proper depth, a little milk or water should be injected through it. If the injection pass, it will shew that the canula is properly placed. If, on the contrary, any obstruction occur, there will be reason to suspect that it is already pushed too far, and that it presses against the *os spongiosum inferius*; in which case the canula must be withdrawn, shortened, and re-introduced as before.

The sore ought to be kept open for eight or ten days after the operation with soft lint spread with emollient ointment, and the whole covered with a compress of soft linen secured with a bandage. An injection of milk and water should be daily passed through the canula; and as soon as the sore looks clean and healthy, the dressings should be entirely removed, and a piece of court-plaster laid over it. In this state it is to be left to heal; but the plaster must be renewed, if matter appear to form beneath it. By this method Mr. Pellier finds, that fistula lachrymalis, not depending upon diseases of the contiguous bones or of the constitution, may commonly be completely cured in two or three weeks, which, by the usual practice, might require several months.

We have thus far spoken of this disease, and its treatment, as suggested by the eminent men whose names have occurred; we have now, however, to introduce to the reader's notice a valuable improvement in the treatment by Mr. Ware, who, in page 26 of his treatise on the Fistula Lachrymalis, describes his method of cure in the following way:

“When the operation is determined on, the following is the mode in which I would recommend it to be performed:—If the disease has not occasioned an aperture in the lachrymal sac, or if this aperture be not situated in a right line with the longitudinal direction of the nasal duct, a puncture should be made into the sac, at a small distance from the internal juncture of the palpebræ, and nearly in a line drawn horizontally from this juncture towards the nose, with a common spear-pointed lancet. The blunt end of a silver probe, of a size rather smaller than the probes that are commonly used by surgeons, should then be introduced through the wound, and gently, but steadily, pushed on in the direction of the nasal duct, with a force sufficient to overcome the obstruction in this canal, and until there is reason to believe that it has freely entered into the cavity of the nose. The position of the probe, when thus introduced, will

be nearly perpendicular; its side will touch the upper edge of the orbit; and the space between its bulbous end in the nose and the wound in the skin will usually be found, in a full-grown person, to be about an inch and a quarter, or an inch and three-eighths. The probe is then to be withdrawn, and a silver style of a size nearly similar to that of the probe, but rather smaller, about an inch and three-eighths in length, with a flat head like that of a nail, but placed obliquely, that it may fit close on the skin (see a front and side view of this instrument, fig. 104, Plate V.), is to be introduced through the duct, in place of the probe, and to be left constantly in it. For the first day or two after the style has been introduced, it is sometimes advisable to wash the eye with a weak saturnine lotion, in order to obviate any tendency to inflammation which may have been excited by the operation; but this in general is so slight, that I have rarely had occasion to use any application to remove it. The style should be withdrawn once every day for about a week, and afterwards every second or third day. Some warm water should each time be injected through the duct into the nose, and the instrument afterwards replaced in the same manner as before. I formerly used to cover the head of the style with a piece of diachylon-plaster spread on black silk; but have of late obviated the necessity of applying any plaster, by blackening the head of the style with sealing-wax.

“The effect produced by the style, when introduced in the way above mentioned, at first gave me much surprise. It was employed with a view similar to that with which Mr. Pott recommends the introduction of a bougie, viz. to open and dilate the nasal duct, and thus to establish a passage, through which the tears might afterwards be conveyed from the eye to the nose. I expected, however, that whilst the style continued in the duct, the obstruction would remain; and of course that the watering of the eye, and the weakness of the sight, would prove as troublesome as they had been before the instrument was introduced. I did not imagine that any essential benefit could result from the operation until the style was removed, and the passage thereby opened. It was an agreeable disappointment to me to find that the amendment was much more expeditious. The watering of the eye almost wholly ceased as soon as the style was introduced; and in proportion as the patient amended in this respect, his sight also became more strong and useful. The style, therefore, seems to act in a two-fold capacity: first, it dilates the obstructed passage; and then, by an attraction, somewhat similar to that of a capillary tube, it guides the tears through the duct into the nose.

“The wound that I usually make into the sac, if the suppurative process has not formed a suitable aperture in this part, is no larger than sufficient to admit the end of the probe or style; and this, in general, in a little time, becomes a fistulous orifice, through which the style is passed without occasioning the smallest degree of pain. The accumulation of matter in the lachrymal sac, which, previous

to the operation, is often copious, usually abates soon after the operation has been performed; and, in about a week or ten days, the treatment of the case becomes so easy, that the patient himself, or some friend or servant who is constantly with him, is fully competent to do the whole that is necessary. It consists solely in withdrawing the style two or three times in the week, occasionally injecting some warm water, and then replacing the instrument in the same way in which it was done before.

“It is not easy to ascertain the exact length of time that the style should be continued in the duct. Some have worn it many years, and, not finding any inconvenience from the instrument, are still afraid and unwilling to part from it. Others, on the contrary, have disused it at the end of about a month or six weeks, and have not had the smallest return of the obstruction afterwards.

“The troublesome ulcerations, which are sometimes formed over the lachrymal sac, heal, in general, as an opening is established through which the tears may pass into the nose. But in two instances which lately came under my care, in which the patients had occasionally been subject to violent cutaneous eruptions, these wounds did not heal so soon as I expected; and a considerable quantity of purulent matter was discharged through the aperture that had been made to admit the style, several days after the operation was performed. Both these cases were evidently relieved by administering internally a weak solution of the hydrargyrus muriatus, together with a light preparation of the Peruvian bark; and by pursuing the use of these medicines, the wounds in a short time closed; the aperture, which had been made with the lancet contracted into a fistulous orifice, just large enough to admit the end of the style, and the purulent discharge wholly ceased.

“The position both of the probe and style is very nearly the same, whether they be passed through the natural nasal duct, or through a perforation in the thin part of the os unguis; and I have reason to believe that it does not essentially signify in which of these ways the operation is performed. It may be proper, however, to point out a few circumstances in which the two operations appear to differ. One is, that in consequence of the nasal duct being lined with a smooth membrane, the instrument usually passes through it with facility; and its passage is unaccompanied with that sensation of a forcible breach, which is perceived by the operator when it makes its way for the first time through the substance of the os unguis. Another is, that when the instrument has passed through the nasal duct, it has nearly a perpendicular position with respect to the usual posture of the body, whereas, when it has passed through the os unguis, it has an oblique direction downward and inward. A third difference is, that in the former instance, the instrument is more firmly fixed than it is in the latter, in which it often has an unsteady motion when touched with the finger. By an attention to

these hints, I think it may be discovered, with tolerable certainty, in which of the two ways the instrument has passed; and, I believe, I may venture to add, that whether the style be introduced in the former or latter of these directions, it is equally able to conduct the tears into the nose, and to accomplish a cure of the disorder."

Mr. Ware, in the outset, represents this discovery as founded on the improvement of the operation by Mr. Wathen, who employed a silver canula, which, instead of being passed through the os unguis, was worn in the duct. Inconveniences, however, resulted even from Mr. Wathen's treatment, and these appear to have been obviated by the use of the style in several cases related by Mr. Ware.—We shall lay before the reader the last of these, drawn up by Mr. Green, surgeon at Peckham, in compliance with Mr. Ware's request, for insertion in his treatise.

"Mrs. S., in the year 1793, was suddenly attacked with an apoplectic fit, whilst standing at the top of a flight of stairs; in consequence of which she fell down several of them, and by the fall one of her teeth was beat out, and the left side of her face much bruised. She soon recovered her recollection; but, for a considerable time afterwards, was deprived of the use of her limbs on that side. The sight of the left eye also became dim; her left nostril was peculiarly dry; and she had frequent troublesome itchings in the left eyelids. In the beginning of the year 1795, she caught cold by going on the water; in consequence of which the left eye and eyelid became inflamed, and a tumor began to form about the middle of the under lid, attended with a hardness nearly resembling that of a stone. The inflammation extended over the lachrymal sac, and the whole of that side of the nose; and the passage for the tears was so entirely stopped, that this fluid trickled continually down the cheek. By the use of fomentations and poultices, together with the administration of cicuta, &c. the tumor was at length brought to a suppuration, and burst. The edges of the sore, however, were very hard, and had an unpleasant carcinomatous appearance. She still suffered violent excruciating pain; and her distresses were much increased by her being at that time between seven and eight months advanced in her pregnancy. In this state of the case Mr. Ware visited the patient with me on the 28th of March. We enlarged the aperture with a narrow-bladed curved knife, and carried the incision into the lachrymal sac. A few days afterwards, I attempted to pass a thin bougie through the ductus ad nasum; but the wound was in such an irritable state, that I was obliged to desist without accomplishing the object I had in view; and, although the patient had experienced relief from the violence of the pain she before endured, by the enlargement of the aperture, the wound had still a very unfavourable aspect, and the tears continually trickled down the cheek. About the end of April, 1795, the operation Mr. W. proposed was performed. The old wound being contracted in size, and situated in the inferior part of

the lachrymal sac, an aperture was made into this cavity with a spear-pointed lancet directly over the entrance of the nasal duct; immediately after which the end of a nail-headed style was introduced into the aperture, and conveyed through the duct into the nose. From this time the wound put on a more favourable aspect, and the tears passed through their natural course. The style was withdrawn every second or third day, and some warm water injected. The old wound was dressed, as was desired, with the ceratum album, mixed with a third part of the flores zinci; and its edges were occasionally touched with the lunar caustic. Mrs. S. was brought to bed in June, and had an easy natural labour. Being afterwards in a very weak state, she returned to the use of bark and cicuta; and the old wound did not completely heal until the end of the year. The watering of the eye, however, totally ceased soon after the style was introduced; and at the present time, which is two years since the operation was performed, she continues perfectly well. There is not the smallest hardness in the eyelid; the scar is very little perceptible; and as to the style, she scarcely thinks it an inconvenience."

We refer the reader to Mr. Ware's treatise for many excellent remarks on this disease, which the limits of our work do not permit us to notice.

CHAP. XV. OF AFFECTIONS OF THE NOSE.

SECT. I. Of HEMORRHAGIES from the Nose.

WHEN the means mentioned for this complaint under MEDICINE have failed, recourse must be had to *compression*. Dossils of lint introduced into the nostrils are sometimes effectual; or the gut of some small animal, tied at one end, then introduced by a probe into the nose as far as the pharynx, and filled with cold water, or that and vinegar, and secured by a ligature, by adapting itself to all the parts, and pressing equally on them, has been attended with advantage. When these remedies likewise fail in their effect, a piece of catgut or wire may be introduced through the nose into the throat, and brought out at the mouth; a piece of sponge, or a bolster of lint of a size sufficient to fill the back-part of the nostril, is then to be fixed to it; the sponge is next to be drawn back and properly applied. Another is to be applied to the anterior part of the nostril and secured. The same may be done to the other nostril, if it be necessary; or the sponge may be of such a size as to fill the ends of both nostrils at the same time. By this contrivance the blood, not finding an outlet, will soon coagulate, and prevent any further evacuation.

SECT. II. *Of the OZÆNA.*

By this is understood an ulceration within the nose, which may be occasioned by external violence, by an exposure to cold, by irritating substances, or by whatever produces inflammation in the membrane lining the nostrils. Sometimes it arises from venereal infection; and in this case the discharge becomes so acrid as to corrode, and produce caries in the bones of the nose. When the disease is local, and not depending upon any constitutional affection, astringent solutions are found to be the most useful, such as a decoction of bark, or that mixed with alum. Dossils of lint dipped in these are to be introduced into the nostrils three or four times a-day; or some prefer the injection of such fluids by means of a syringe as being more effectual. If stronger astringents be necessary, a solution of sublimate ought to be used. At bed-time an ointment prepared with zinc or lapis calaminaris ought likewise to be applied, and a blister to the temple. A decoction of *water-dock root*, internally, has cured the disease.

Instances, however, occur, where the discharge is occasioned by a collection of matter within the antrum maxillare; and then it is apt to resist every effort till a proper outlet be given to it.

When the complaint is owing to venereal infection, the primary disease is to be attended to, and mercurial preparations are to be applied to the part; but when the bones are carious, till these are removed we need neither expect that the discharge will cease, nor the disease be otherwise completely cured.

SECT. III. *Of IMPERFORATED NOSTRILS.*

Sometimes the nostrils are in part or entirely obliterated. This may be owing to burns; small-pox; different kinds of sores, especially those of a venereal nature; and sometimes it is the effect of original conformation, for it has been observed in new-born children.

When any opening exists in the obstructed nostril, it may be readily dilated by the introduction of a furrowed probe, and then cutting upon it in the course of the adhesion: but when no passage appears, the operator must endeavour, by means of a scalpel, to discover one of the nostrils; and when discovered, it must be enlarged by a director and bistoury, as in the former case. The other nostril is to be treated in the same manner. After the openings are formed, they might be preserved of a proper size by the introduction of dossils of lint, which should be frequently cleaned or renewed; but metallic tubes answer the purpose better, and allow the patient to breathe freely through them till a cure is performed. Previous to

their introduction, they ought to be covered with soft leather spread with emollient ointment, and retained till the sores are completely healed.

CHAP. XVI. OF AFFECTIONS OF THE MOUTH AND THROAT.

SECT. I. *Of the Division of the PAROTID DUCT.*

WHEN the parotid duct is divided, the saliva which it transmits passes over the cheek instead of going into the cavity of the mouth.

When the surgeon is called to a recent division of the duct, he ought to lay the divided ends of it as exactly together as possible, and to retain them in their situation till they are united, by adhesive plasters, or by the twisted suture if there be considerable retraction of the parts. But when the portion of the duct next the mouth is entirely obliterated, an artificial passage must be made into the mouth, and an union formed between the opening and that part of the duct which proceeds from the parotid gland. The artificial passage ought to be as much as possible in the direction of the natural duct. For this purpose a perforation of a proper size is to be made obliquely into the mouth with the trocar (Plate II. fig. 35), from the side of the wound exactly opposite and contiguous to the under extremity of the upper portion of the duct; and then a piece of leaden probe of the size of the perforator should be introduced by means of the canula, and be kept in the cheek till the sides of the opening become callous; when, the lead being withdrawn, the extremities of the artificial and natural ducts are to be brought into contact, and retained there by adhesive plaster till the cure is completed. Another method has, in a few instances, been followed by Mr. Latta (see his *System of Surgery*), of introducing one end of a bit of catgut into the artificial opening, and bringing it out at the mouth, while the other is introduced a little way into the extremity of the natural duct, and retained by adhesive plaster till the wound is healed. Whichever way the operation is done, the patient should live upon spoon-meat, and make as little motion as possible with his lips or jaws.

SECT II. *Of the HARE-LIP.*

The hare-lip is a fissure in the upper lip, very seldom in the under one. It is attended with want of substance, and has its name from a resemblance to the lip of a hare. In general it is only a simple fissure, though sometimes it is double; in which case it renders a cure more difficult to be executed. There are many lips where the want of substance is so great, that the edges of the fissure cannot be

brought together, or at least where they can but just touch, and then the attempt should be forborne. It is likewise improper in infants, and ought not to be performed till several months after they have been weaned, when they will have acquired more strength to undergo the operation, and will be less liable to be attacked with bowel complaints, which frequently make them cry at an earlier period of infancy.

In proceeding to the *operation*, the patient, if a child, should be secured upon a person's knee, or rather perhaps upon a table; but if an adult he is to be seated upon a chair, in a proper light. The *frænum* connecting the gums to the upper-lip is to be divided; if a fore-tooth project so much as to prevent the parts from being brought properly together, it is to be extracted; or when the fissure runs through the bones of the palate, if a small portion of the bone project, this must be removed. Matters being so far adjusted, the operator is to lay hold of one side of the fissure between the thumb and forefinger, or between the forceps (fig. 36), then with a pair of sharp and very strong crooked scissors, or with a scalpel, to cut off a thin portion of the lip, and to repeat the same thing upon the other side of the fissure, so as to render the whole edges of the fissure completely raw; by which, if the operation be properly performed, a piece will be separated in form like an inverted V. After the incisions have been made, the vessels should be allowed to bleed freely to prevent inflammation; and when the bleeding has ceased, the sides of the wound are to be brought accurately together, and kept in that state by the twisted suture. The first pin ought to be as near as possible to the under edge of the lip; another is to be inserted near the upper angle; and if the patient be an adult, a third pin will generally be necessary, half way between the other two. In passing them, they ought to go rather deeper than half through the lip, that the edges of the wound may be kept properly in contact. An assistant now keeps the parts together, while the operator applies a firm waxed ligature first to the under pin; and having made three or four turns with it in the form of an 8 figure (fig. 37), it should then be carried about the second, and in a similar way about the third, care being taken that the thread be drawn of a proper tightness. After the ligature is secured, a piece of lint, covered with some mucilage, should be laid over the wound to protect it from the air; and this is commonly all the bandage necessary. When, however, from a great want of substance, the retraction has been considerable, some advantage is derived from the use of adhesive plasters applied to the cheeks and tied between the pins. During the time of the cure the patient should be fed upon spoon-meat, and prevented from making any exertion with the lips, otherwise the cure will be considerably retarded. At the end of five or six days the pins may be taken out, when the parts will commonly be found completely united.

In the case of a *double hare-lip*, the operation should be first done upon one fissure; and when a cure is completed there, it may be done safely upon the other.

SECT. III. *Of the EXTIRPATION of CANCEROUS LIPS.*

The under lip is much more frequently attacked with cancer than the upper, or indeed than any other part of the body. And as little dependence is to be placed upon external applications or internal remedies, recourse must be had to the knife as the only certain method of cure.

When the disease has not attacked any considerable part of the lip, the diseased part is to be cut out, the sides brought together, and the wound cured by the twisted suture. The operation ought therefore to be performed early, to allow the parts to be brought properly together. The general steps of the operation are nearly the same as in the operation for hare-lip, and therefore need not be repeated. It is only to be observed, that *all* the diseased parts are to be removed, taking care to make the cut in such a way as will most readily admit of the twisted or hare-lip suture. When the parts can be brought together, the lip will have nearly the same appearance as in the operation for hare-lip; but when the disease spreads over a considerable part of the lip, so as to prevent the sound parts from being united after the diseased parts have been removed, all that can be done is to remove the parts affected, secure the bleeding vessels, and dress the sore like any other recent wound.

SECT. IV. *Of AFFECTIONS of the TEETH.*

I. *Dentition.*] In dentition the gums inflame and swell about the parts where the teeth are afterwards to appear; the child is continually rubbing the gums with its fingers; the saliva is commonly increased in quantity, though sometimes the contrary happens: sometimes the bowels are remarkably costive, though more frequently the reverse: there is generally quick pulse with heat, and other symptoms of fever; and on some occasions these symptoms are attended with convulsions. The means found to be most useful here are such as are most effectual in allaying irritation: as opiates, blisters, and especially warm-bathing. When these fail, cutting the gum by means of a fleme (fig. 48), over the approaching tooth, is frequently found to remove every symptom; but this ought to be done earlier than it commonly is, to have the full effect. Whenever the symptoms give reason to think that a tooth is approaching, the gums should be cut freely over that part where the teeth may be first expected. When the symptoms recur, the operation should be re-

peated. A crucial incision is attended with still more effect; and the bleeding which afterwards takes place is of considerable service. The incision should always be carried as far as the tooth, which ought to be somewhat exposed; and when properly done, is frequently followed with immediate relief. Sometimes the same kind of symptoms attend the cutting of the second set, particularly of the dentes sapientiæ. When this is owing to the thickness of the gums, scarifying gives the greatest relief; but sometimes it is for want of room in the jaw, and then the tooth should be drawn.

2. *Derangement of the teeth.*] This happens more frequently in the second than the first set, and more commonly in the fore than in the back teeth. This may be owing to the first set remaining in the jaw after the second have appeared. Another cause is a want of space in the jaw; and a third is a mal-conformation of the teeth, where they are too large in proportion to the jaw, and therefore overlap each other. The remedy is the same in each of these cases, viz. to extract the teeth which stand in the way of the rest, to allow those which are out of their place to come into the row, and put on a more uniform appearance.

The usual method of moving teeth which are out of the row is, by fixing them with a ligature to the nearest teeth; or the same thing is done by metalline plates or pieces of wire. But these methods have not been found fully to answer the purpose intended, though in some cases they may be useful. When one or more front teeth are accidentally drawn out of the jaw, they ought to be immediately replaced. When the teeth are broken or otherwise injured, they may be supplied with others transplanted from the jaws of another person; but this can only be done when the sockets have been newly emptied, for after inflammation comes on it is impracticable. In these cases the inflammation must be allowed to subside, and then artificial teeth can be readily adapted.

3. *Loose teeth.*] When the teeth are loosened by external violence, by falls and blows, or by improper use of instruments in pulling diseased teeth in the neighbourhood of sound ones, they may again be made tolerably fast by pressing them as firmly as possible into their sockets, and preserving them so with ligatures of catgut, Indian weed, or waxed silk, and keeping the patient upon spoon-meat till they are firm. When loose teeth are owing to tartar, nothing will fasten them till the cause be removed; and this ought to be done early, otherwise it will have no effect. Frequently the teeth become loose from a sponginess in the gums, often, but improperly, attributed to scurvy. The best remedy is scarifying the gums deeply, and allowing them to bleed freely; this should be repeated till they are fully fastened. Mild astringents, as tincture of bark, are here attended with good effects, though those of an acid nature will certainly do harm. The mouth should be frequently washed with cold water strongly impregnated with these, and the patient

should not use the teeth which have been loose till they become firm again. The loosening of the teeth in old age cannot be remedied, as it is owing to a wasting of their sockets, from which the teeth lose their support.

4. *Foul teeth.*] The teeth sometimes become *yellow* or *black* without any adventitious matter being observed on them; at other times they become foul, and give a taint to the breath, in consequence of the natural mucus of the mouth, or part of the food remaining too long about them. The most frequent cause of foul teeth is the substance called *tartar*, which seems to be a deposition from the saliva, and with which the teeth are often almost entirely incrustated. When this substance is allowed to remain, it insinuates itself between the gums and the teeth, and then gets down upon the jaw in such a manner as frequently to loosen the teeth. This indeed is by far the most common cause of loose teeth, and when they have been long covered with this or with any other matter, it is seldom they can be cleaned without the assistance of instruments. But when once they are cleaned, they may generally be kept so by rubbing them with a thin piece of soft wood made into a kind of brush, or with a brush of very strong bristles; after which the mouth is to be washed with common water.

Mr. Blanchet, of Quebec, has discovered, that an acid is formed near and round carious teeth. Being anxious for the preservation of several of his teeth, which were wasting and crumbling away in the common manner, he undertook to find out, experimentally, the nature of the agent which thus preyed upon them. In the course of these trials, he became satisfied, repeatedly, that if he omitted for several days to clean his teeth, the fluid collected within their cavities, would turn the tincture of turnsole to a red colour: and, when carefully applied to the tongue, would excite a considerably sour taste. The saliva alone produces neither of these effects: nor is the tincture of turnsole reddened but in the faintest degree by the fluid if the teeth have been frequently washed. The acidity is inherent in the fluid only which is contiguous to the carious surface: it is not presumed that it is the carbonic acid, for this would fly off in gas, in so warm a temperature as that of the human mouth. It was not derived from cider, porter, or acid drink, none having been taken. Mr. Blanchet thinks it is probably the septic [nitric] or phosphoric acid, or a mixture of both.

When the teeth are to be *cleaned by instruments*, the operator ought, with a linen cloth, or with a glove, to press against the points of the teeth, so as to keep them firm in their sockets, with the fingers of the one hand, while he cleans them with the necessary instruments, fig. 41. No. 1, 2, 3, 4, 5, held in the other; taking care not to scrape them so hard as to loosen them, or to rub off the enamel. This being done, the teeth should be rubbed over with a small brush, or a piece of sponge dipped in a mixture of cream of

tartar and Peruvian bark. The same application may be made to the teeth for a few days, after which they may be kept clean as already directed.

The teeth are sometimes covered with a thin dark-coloured scurf which has by some been mistaken for a wasting of the enamel, but which is only an extraneous matter covering it. By perseverance this may be cleaned off as completely as where the teeth are covered with tartar; but it is apt, after some time, to appear again. When this is observed, the same operation must be repeated.

For the purpose of applying powders or washes (which ought to be of the simplest and most innocent kind) to the teeth, a brush or a sponge is commonly employed. The latter is supposed preferable, as being less in danger of wearing down the enamel, or of separating the teeth; of this, however, there is, in fact, no danger. The use of the former hardens the gums and more certainly prevents the accumulation of tartar, and the stronger the bristles of which the brush is made, and the more freely it is applied, even to the gums themselves, the better.

5. *Tooth-ach.*] The causes producing this may be exposure of the nerve of a tooth, by breaking or wasting of the enamel, inflammation in or about the tooth, or from sympathy when distant parts are affected, as the eye, the ear, the stomach, or the uterus, as in time of gestation. After tooth-ach has once been produced and removed, it is apt to return by exposure to cold, by taking hot liquids, by hard bodies pressed against the nerve in the time of chewing, by the use of a pick-tooth, &c.

With respect to the cure of this disease, no rule can be laid down which will answer with certainty upon all occasions. No remedy has yet been discovered which will at all times even moderate the pain; relief, however, is frequently obtained from acrid substances applied to the tooth, so as to destroy the irritability of the nerve, such as opium, spirit of wine, camphire, and essential aromatic oils. When these fail, blisters behind the ear, or destroying the nerve by the cautious use of strong acids, as half a drop of the nitric conveyed into the hollow of the tooth by the help of a small camel's-hair pencil, will be found useful. A red-hot wire applied to the part, which is attended with only momentary pain, is generally a radical cure, and often successfully practised by empirics.

When a black or decayed spot appears on a tooth, if it be quite superficial, it may be removed; but if it go through the thickness of the enamel, it will be more advisable to let it remain. Some dentists, however, cut out these black spots, shewing only the first signs of caries, and thus preserve what remains of the tooth.

When a small hole breaks out in a tooth, particular attention should be paid to prevent the admission of air. Tin, lead, or gold leaf, commonly employed for this purpose, sometimes give relief for many months, or even years, if the shape of the cavity be favourable; but

in other cases these are of little advantage, and in some instances create great pain. When stuffing is to be employed, it ought to be done in the intervals of the fits of tooth-ach, otherwise it will give great uneasiness. When it is to be used, the whole cavity of the tooth should be filled; and this is to be done with the instruments, fig. 42, No. 1, 2, 3, in Plate II.

In the Medical and Physical Journal is inserted an account of a singular remedy for the tooth-ach. It is the well-known insect, called a *lady-cow* (*coccinella septem punctata*. Linn.), which is to be bruised between the finger and thumb, and applied to the affected tooth; rubbing it also on the gum. It is even said that a tincture made from these insects will be attended with the same beneficial effects.

Dr. Handel, of Mentz, recommends the following remedy as a very powerful sedative in tooth-ach, when occasioned by corrupted or hollow teeth. Upon the application of it, the doctor says, the excruciating pain almost instantly ceases.

(No. 84.) R Olei hyoscy. ʒj.

Opii ʒss.

Extract. belladon.

Camphoræ, aa gr. vj.

Olei cajeput.

Tincturæ cantharidum, aa gtt. viij.

Redigantur in formam opiatæ.

The following observations on odontalgia, with the explanation of an apparatus that has been employed in relieving it (see Pl. V.), are addressed to the Medical and Physical Journal, by Dr. Brown.

“The tooth-ach,” says the doctor, “the most frequent and painful disease incident to the human body, is often occasioned by being exposed to a partial current of cold air, or to sudden heat and cold; by residing in a marshy or damp situation; by morbid matter within, by acrid matter attached to the external surface of the teeth, and frequently by the muscles and membranes of the jaw being affected by the same diathesis which produces irritation, gout, and rheumatism in other parts. Women are more liable than men to rheumatisms and to tooth-ach; they are most subject to both in pregnancy and during obstructions of the menstrual discharge.

“It has also been observed, that mercurial preparations thrown into the system, so as to affect the salival glands; nervous affections; sipping hot liquors; frequent picking of the teeth with hard instruments; a scorbutic and some other acrimonious state of the fluids; probably often occasion a caries of the teeth: and I have known several families, who seemed particularly liable to their premature loss and decay.

“Sir Hans Sloane gives an instance of the virtues of *semen hyosciami*, in alleviating the tooth-ach. A person of quality, tormented with this racking pain, had an empiric recommended to him, who

conveyed the smoke of burning seeds of henbane, by means of a funnel, into the hollow tooth, and thereby removed the pain; but, at the same time, there dropped some maggots from the tooth (as the operator pretended) into a pail of water placed underneath for that purpose. Sir Hans procured one of these maggots, which he sent wrapt up to M. Lewenhoeck, at Delft in Holland, where it arrived safe and alive. Upon examination, M. Lewenhoeck found it to be entirely like those bred in ordinary rotten cheese; wherefore he procured some of these latter, and carefully fed them both, and that one Sir Hans Sloane had sent, on the same cheese; and they were all, according to the usual methods of nature, turned into small scarabei, both being returned such to Sir Hans from Holland. Upon the whole, though the henbane seeds cured the tooth-ach, it is highly probable that the maggots had been conveyed thither, and let drop into the water by some slight of hand.

“We learn from the writings of Dioscorides and others, that *hy-sciamius*, which is a powerful remedy of the narcotic tribe, has been employed as an anodyne by the most illustrious physicians, from the earliest periods of medical history. It appears to have been the favourite sedative of Celsus; he gave it internally to mitigate pain and procure sleep; he used it externally as a collyrium, in cases of ophthalmia; and he employed it topically to assuage the pains of the teeth and gums. Accordingly, under the head of ‘*Dentium doloris varia remedia*,’ he says, with his usual eloquence and precision, ‘The tooth-ach is a disorder that may be justly ranked among the greatest torments;’ and he tells us, ‘if the pain be severe, a clyster is useful, with hot cataplasms applied to the cheek, as also some medical hot liquor held in the mouth, and frequently changed. For which purpose is used, henbane root, either in vinegar and water or diluted wine, with the addition of a little salt to either of them, and poppy heads not over dry, and mandrake roots prepared in the same manner; but in these three, care must be taken not to swallow what is in the mouth.

“Mynsicht who has long been respectfully named in our dispensaries, gives, in his *Medico-Chymicum*, the following formula, which are all designed for the use of persons afflicted with painful affections of the teeth and gums, viz. *Tinctura Odontalgica*, *Pilulæ Odontalgicæ*, inserted in Dr. Lewis’s Dispensatory, p. 330, 5th edit. *Trochisci de Alumine* with *radix Pyrethrum*, *Spiritus Odontalgicus*; in all which he directs a certain portion of the seeds of henbane. Salmon, whose labours seem not to have been duly appreciated by his countrymen, and Etmuller, prescribe them for the same purpose. Boerhaave had his senses disordered by only using a plaster from this plant. Yet, as the various medicines I had myself hitherto employed were of little avail, and as I had some teeth extracted, and obtained in one instance only twelve hours’ respite from my sufferings, the pain flying either to another tooth, or at-

tacking the *antrum maxillare*, I tried the effect of fumigating with the following :

(No. 85.) R. Sem. Hyoscy. p. ij.

Sem. Carui

Sem. Cumin. aa. p. j. Misce.

“ After repeating the operation three times, I remained near a fortnight exempt from pain : I then had occasion to have recourse to the fumigation again, and was again relieved; and in the mean time a permanent cure was obtained by the use of internal medicines, which had never occurred either to myself or any of the many skilful and experienced practitioners who had been consulted, on what appeared to some of them as a case equally inveterate and extraordinary.”

In case of a carious tooth, extraction is often the only radical remedy; but as in some cases extraction is improper, and as in many instances it is obstinately avoided, Doctor Brown had a vessel made of copper, of which see an engraving in Plate V. “ The apparatus takes in pieces at the line *a b*, and also at *c*: The bottom is fitted into a wooden stand turned with a groove, to prevent its slipping out of the hand of the operator. In the centre of the bottom of this vessel (as the tube at the bottom of a lanthorn for the reception of a candle) is a piece of metal shaped to receive the bowl of a large tobacco-pipe, with an opening large enough to receive the stalk of the pipe opposite to the hole at *b*. The apparatus being taken asunder at *a, b*, the cup or bowl of an iron or common clay tobacco-pipe is made red hot, filled quickly with the seeds, placed in the aperture formed for its reception, the conical or upper part being restored to its place, as in the engraving; the tube *c* is turned upwards or downwards, as the pain may happen to be seated in the upper or lower jaw*; and being placed in contact with it, the operator, applying his mouth to the tube of the pipe, forces by his breath, into the mouth of his patient, the smoke of the burning seeds, which, by their heating, sedative, and sialagogue effect (sometimes it being necessary to repeat the process), generally afford the patient considerable relief.”

6. *Tooth-drawing.*] When the remedies made use of for the removal of tooth-ach have failed in their effect, and it is found that the complaint still continues, it will be necessary to *extract the tooth*. In doing this, it may be observed, that all the teeth may be pulled to either side, excepting the dentes sapientiæ of the lower jaw, which ought to be pulled outwards, otherwise the jaw may be splintered. As soon as the socket is cleared of blood, if the tooth be not much spoiled, it may be boiled and replaced, when it will become nearly as useful as before. It is difficult, however, to replace the large

* The small tube marked *d*, is intended to be used when pain is seated in the front teeth.

grinders, on account of their diverging roots. The more perpendicularly the teeth are pulled, the less contusion and injury will be done to the jaws and alveoli. But as no instrument has been invented capable of effecting this properly, surgeons are obliged to be contented with an instrument which acts in a lateral direction. The most usual is that well-known instrument in form of a key, with a claw and fulcrum. Previous to the operation, this should be covered with a linen rag, to prevent the gum from suffering. After dividing the gum, or separating it from the tooth, the claw is to be fixed as deep between the teeth and gum as possible. Then the fulcrum is to be applied on the opposite side. The surgeon may now, with one turn of the handle of the instrument, pull the tooth out at once. But the turn should not be effected by a sudden jerk, but in the most cautious and slow manner. When it happens to be one of the great molares, whose roots diverge very much, and when they are firmly fixed, after only loosening it with the first pull, the claw of the instrument is to be applied to the other side of the tooth, and the turn given in a contrary direction to the first. After it has been sufficiently loosened in this manner, it is to be laid hold of by a common teeth forceps (fig. 43), and extracted in the easiest manner. Upon extraction of the tooth, any detached splinters occurring are to be immediately removed. Should any considerable hemorrhagy take place, the patient may take some cold water, vinegar, or spirit of wine, into his mouth, or dossils of lint may be introduced over the socket. Should all these fail, recourse must be had to the actual cautery.

When stumps occur from caries, or when the teeth have broken in time of the extracting, the common key will sometimes remove them; if that fail, the punch (fig. 44) is to be used. The operator, having this instrument in one hand, is to place the fore-finger of the other, with a piece of cloth wrapped round it, upon the inside of the jaw opposite to the stump, to protect the neighbouring parts.

To this account of the usual means of performing this operation we propose to add the following remarks on the extraction of teeth, with a view to lessen its danger; and the description of a new scarificator, and an instrument for drawing teeth, communicated to the editors of the Medical and Physical Journal, by Dr. Dyce, of Aberdeen (see Pl. V.)

“Every person conversant in the operations of surgery,” says Dr. Dyce, “knows how to extract teeth; but few, comparatively, who perform this operation, consider the danger that attends it. If I wish to draw a nail (which having been retained for some time in a wall, and, by means of the oxygen contained in the atmosphere, converted partly into an oxyde, nearly resembles a carious tooth), I can extract it with the assistance of a common hammer, by fixing the nail between the claw; this is easily done, as the latter adapts itself to any size (being nearly the form of the letter V); then forcing

the handle to one side, I thereby form a fulcrum on the edge of the hammer, or the side of the claw, and by the power which the long handle or level affords, I am enabled either to extract the nail, or perhaps to break it; but should there be the least appearance of so doing, I then immediately force the handle to the other side, and on taking another hold, the nail, in all probability, will come out complete or entire. Such is precisely the case with regard to the drawing of teeth; for whenever the pull is too great to venture upon, by changing the claw of the instrument, and fixing it on the other side, the tooth being already loosened by the first attempt, a small degree of force only will be requisite to bring it to the other side, and it will then come out along with the instrument; yet never without some injury being done to the alveolar process. To be convinced that this must be the case, we need only consider the position of the hammer in pulling the nail, as it is more completely exposed to view, both instruments being perfectly similar in their application and principles. On the first attempt to pull, we find that the nail begins to bend to one side; an additional force brings it out a little, but in what direction? not in a straight line, but in a curved one, forming a segment of the circle, which would be described by placing one leg of a compass at the fulcrum, or that part where the hammer rests, and extending the other leg to the nail; then drawing a circle by means of this known radius, the nail when extracted, would exactly correspond with a part of the circumference of the circle drawn. But as the human teeth do not bend, being different in their texture from that of the metal of which the nail is composed; and as the bed or socket in which they are lodged, is likewise different from the wood in which the nail is inclosed; it is not to be wondered at, that one or other of them will give way, considering the short turn which the instrument must, from its construction, describe.

“ Let us suppose the claw placed (either outside or inside) upon the tooth, with the point of it as near to the gum as possible, the rest or fulcrum also being placed on the opposite side, as near to the jaw as may be without resting upon it, then by taking hold of the handle of the instrument in the right hand, we give it a twist, which we shall suppose brings it out, yet so that one or other of the circumstances already mentioned will take place, viz. the tooth broke and part of the fang retained in the cavity, and if so, the former complaints very often will continue, and sometimes increase beyond endurance; or, if the tooth be whole, a considerable splinter of the alveolar process will be brought out along with it.

“ These inconveniences, not to mention the great pain and dangerous consequences that frequently ensue, have not passed unnoticed by professional men, in every country where the key instrument has been in use; an instrument too well known to require a description here, as no person capable of judging of its imperfections

can be ignorant of its construction. The instrument used a century ago for the same purpose does not materially differ from the one at present in use; it no doubt has undergone a variety of form, but the principle remains the same. Among the numerous attempts to improve it, the only one, not materially different from the old instrument, and which merits particular notice, is that proposed by Mr. Savigny, surgical instrument maker, in London, and described in the 7th volume of 'Medical Facts and Observations.' That gentleman has certainly heard many complaints, and is himself well qualified to judge of the imperfections of the old instrument, but the improvement which he wishes to introduce (consisting of a small cylinder or bolster on the end of the instrument, placed on the tooth as near to the process as possible, the claw being fixed to the circumference of this cylinder) by no means performs what he intends or says, viz. 'the extraction of the tooth in nearly a perpendicular direction.'

"A trial of the instrument is scarcely necessary to prove this; a simple inspection of it only may suffice to convince us that the end proposed is not here attained, and also that his instrument is not materially different from the common one, either in its direction, or power of action.

"It is scarcely necessary to mention, that the only advantage which this instrument possesses over those in common use, is the short time that is required in changing the claw from one side of the tooth to the other; but this is not always necessary, and it is only an additional expence to the price of the instrument, without producing any advantage equivalent thereto. The principal objection to it, and the disagreeable consequences that ensue from the use of all other instruments, which have been contrived for extracting teeth, is certainly the following: the short lateral turn or curve which the instrument describes when in action. But how is this to be remedied? We can easily find out imperfections, and yet the means hitherto employed for the removal of them have not been attended with that success which the importance of the object deserved. All who have considered the common key instrument, or indeed any one with which we have been yet made acquainted, will agree, that the sudden turn, described by the tooth or instrument while extracting, occasions most of the inconveniences attending the operation: when this is known, the practitioner will naturally say to himself, the main thing required is to pull the tooth in a perpendicular direction, or rather in the direction of its axis; but when again we come to consider how this is to be done, a question occurs, what instrument can be used, which will have sufficient power, and yet be applicable in so confined a situation? The solution of this seems insurmountable.

"We have already considered the inconveniences attending the use of the key instrument as commonly applied, by its suddenly turn-

ing the tooth to one side; what we have now to consider is, whether it be possible to extract it in the direction of its axis, or in a perpendicular direction, and in what way? If we again consider how the hammer is employed in extracting a nail in another direction, we shall at once conclude, that another instrument, or at least one constructed on different principles, will be requisite for that purpose. If I wish to pull the nail in a more perpendicular direction, fix it first in the claw, then by causing the end or solid part of the hammer to rest upon the wall, I do not force it to one side, but pull exactly in the direction of the claw, by which means the nail is raised nearly in a perpendicular direction, or rather in the direction of a segment of the circle formed by the point of the claw of the hammer where the nail rests, taking the solid part or other end of it, where the fulcrum is, for the centre. In nearly a similar way, would I propose teeth to be extracted; the instrument, however, for this purpose will be best understood from the annexed drawing.

"A B, fig. 1, represents the instrument nearly of its proper size, and resembles in a great measure the common stump forceps. Attached to the forceps at C is a semicircular piece of wood or metal, the under part of which is stuffed and covered with leather: this semicircular piece is so constructed that it may be slipped off at pleasure, and a larger or smaller one adapted, as the case may require: whenever this instrument is to be used, it is requisite, in the first place, to observe that there be no vacancy between the tooth to be extracted and the front teeth: then, having previously well separated the gum from the tooth, the point of the instrument is to be applied on each side of the tooth as low down, and taking as firm a hold of it, as possible; then by depressing the handle, at the same time taking care not to lose hold of the tooth, the semicircular piece rests upon the anterior teeth, and forms a fulcrum, yet it produces a very different effect at the point of the instrument, which a common prop would do; for by means of it, the tooth, when raised, describes, not the circle which would be formed by taking the distance between the point of the instrument and the fulcrum, but one that is of a much larger radius; which of course comes nearer the direction wanted, the perpendicular. I am well aware, that one great objection will be offered to the use of this instrument, and that is, in cases where one, two, or three teeth are wanting, and where there is nothing to rest upon but the gum. Even in such cases, this inconvenience may be easily obviated by having a flat piece of metal with a small handle attached to the side; this flat piece being stuffed in the under side and covered with leather, should be placed upon the gum; then the semicircle of the instrument rests upon it as upon the teeth, and in this way the instrument may be used with as much facility in the one case as in the other.

"The force necessary to draw a tooth is not so great as one would be apt to imagine, provided the cords (if I may be allowed so to call

the gum) be completely separated from the tooth, which by the bye is seldom done by any operators. Indeed, most persons that are in the practice of extracting teeth, complain of the difficulty of dividing the gum from the tooth completely; and a very eminent writer (Mr. Hunter) on this subject, says, 'It is a common practice to divide the gum from the tooth before it is drawn, which is attended with very little advantage, because at best it can only be *imperfectly done*;' and he adds, 'But if such a separation, as can be made, saves any pain in the whole of the operation, I should certainly recommend it, and at least, in some cases, it might prevent the gum from being torn.' Now what I wish to advance on this subject is, to endeavour to point out a method of performing this part of the operation *completely*; for the author above quoted certainly does not mean to affirm that it is useless, but only that the method at present in use does not answer the intention. If we examine any of the scarificators commonly used for the purpose, we shall soon be convinced that they cannot answer the end fully, and we shall find also that they are so constructed as not to admit of being applied exactly round the tooth; for, with all the care which we can possibly exert to go round the convexity of the tooth, still there will be some part which cannot be come at. But, by substituting the following simple *scarificator*, all these defects will be completely remedied. D E, fig. 2, represents the instrument I propose, of its proper size; the handle at F unscrews, and in it is contained three, four, or six blades, or scarificators, any one of which may be applied at pleasure; for by unscrewing the stem at G out of the knob K the blade H also unscrews, and another of a different form may be substituted, and can be made *dead fast* in any direction by means of the screw at G so that it may be exactly adapted to the curvation of the tooth, and of course the gum separated more completely than by any former scarificator. I represent blades of different forms; one form being found, on some occasions, more convenient than another; and as any of them will fit the screw at D they may be made fast in any direction, by means of the screw in the point of the stem at G.—K represents the small button or end-piece unscrewed from the stem, and without a blade."

7. *Transplanting teeth.*] Teeth can never be *transplanted* with propriety in childhood or in old age. The constitution must be free from those diseases which affect the gums. The tooth to be transplanted must be taken from a person of a sound constitution, otherwise it will convey infection. If the tooth fit the socket properly, there will be no occasion for using a ligature to fix it; but if a ligature be found necessary, it may be made of threads of fine silk properly waxed. After the operation is finished, the patient ought to avoid whatever may be in danger of shaking the tooth, and this is to be attended to till the tooth is perfectly firm. He should also guard against cold and moist air, and live upon spoon-meat.

With these precautions, if the transfer of the tooth be *immediate*, there is no doubt but its living principle will be preserved, and it will become a part of the person into whose jaw it has been conveyed. Mr. Hunter has written much on this practice, which, however, has been rendered somewhat dubious, by the inconvenient and even *fatal consequences* which have unhappily attended it in certain instances. Some of these appear in the Memoirs of the Medical Society of London, from which we extract the following, by Dr. Lettsom:

"On the 23d of August, 1785," says the doctor, "I first visited J.Y.—, esq. from whom I learned, that about two months before, he had had two of the central incisors removed, and about a week afterwards, the right exterior incisor, which were replaced by a celebrated dentist from two young women, who were supposed, by an eminent surgeon, to be perfectly healthy, after having made the most minute scrutiny to ascertain the fact.

"For the space of six weeks after the first operation, no inconvenience resulted; but after this period, a painful sensation between the two first transplanted teeth came on; the patient, however, endured it for a week before he made application to the surgeon, who recommended him to take Peruvian bark and laudanum freely, which he continued to do for the space of another week, when I was consulted.

"When the painful sensation I have mentioned first excited the attention of the patient, he recollected that he had been out later than usual, on the preceding evening, and imagining he had taken cold, he ascribed the present symptoms to this cause, not having at this time any other motive of suspicion; and the transplanted teeth had previously acquired nearly a natural firmness.

"During the use of bark and laudanum, for the week prior to my attendance, the pain continued; and an ulceration had taken place in the gums of the interior surface of the two first transplanted teeth, and gradually extended to the root of the right incisor.

"I have already observed, that I visited this gentleman eight weeks after the two central incisors had been replaced: the day preceding my attendance, he had felt a slight soreness and swelling of the glands of the neck and throat, which were painful on pressure, but no ulceration was perceptible in those parts.

"I found an ulceration interiorly, extending about half an inch from the teeth, on the surface of the roof of the mouth; and longitudinally, the extent of the three teeth; the ulceration had an irregular jagged loose appearance, with livid, sphacelated interstices. The external gums were also, but much less, ulcerated, and of a more clean, and less gangrenous aspect; but the whole together was such as would have given me the suspicion of a venereal disease in any other situation. The teeth were become loose, and particu-

larly one of the central incisors; the external one was by much the most firm.

"In other respects the gentleman was in a tolerable state of health, of chaste morals, and careful in his mode of living. He had very lately, before the operation, arrived from the West Indies, and had not yet acquired the European vigour of health, though not in any state of disease. Since the first sensation of pain, he complained of feverish heat, and underwent restless nights.

"At my first visit I ordered him to take a grain and a half of opium, and two grains of calomel at bed-time; a draught every four hours, containing a drachm of bark, in powder, and a drachm and a half of Huxham's tincture of bark; and to sprinkle the ulcerations with a powder of two grains of calomel, and ten of olibanum."

In a consultation, on the 25th, with three surgeons of eminence, besides the dentist, it was concluded to omit the mercurial, and to give a drachm and a half of cinchona, with ten drops of tincture of opium, in a neutral mixture, every four hours.

"Since the 23d," says Dr. Lettsom, "there was very little alteration in the symptoms, which, however, were in no respect aggravated.

Aug. 26th. "The ulcerations continue much the same; the pulse is regular; an efflorescence for the first time appears on the skin: the same quantity of Peruvian bark was continued, with twelve drops of thebaic tincture in each dose.

27th. "The ulcerations much as before, at least there is no appearance of amendment. The remedies were continued.

28th. "The bark was with difficulty retained on the stomach; it was however continued, and four ounces of a decoction of sarsaparilla ordered to be taken after each powder.

"The efflorescence on the skin is almost general; of an obscure red colour, resembling a syphilitic eruption in every respect, so far as I could ascertain.

"The ulceration of the gums does not diminish: a lotion of one drachm of caustic alkali in half a pint of water, with half an ounce of gum-arabic, was directed to be frequently applied to the ulcerations.

Sept. 2d. "The ulcerations have not increased, but rather diminished; the eruption on the skin is rather paler; an ulceration of the tonsils is now perceptible; the patient expresses relief from the use of the lotion; the teeth are very loose.

8th. "The ulcerations of the gums are more extended, jagged, and sphacelated; the strength of the patient is greatly reduced; he complains of head-ach and want of rest, with feverish heat in the evening, and profuse sweats in the morning. One eye is very much inflamed.

"He was ordered to take a quarter of a grain of corrosive sublimate twice a-day, and to apply to the ulcerations a solution of three grains of sublimate in half a pint of water.

10th. "The ulcerations increase; the teeth are ready to drop out of the sockets, particularly the central incisors; the sublimate excites great uneasiness in the stomach, and is therefore omitted; both tonsils are become alarmingly ulcerated.

"The patient expresses great dislike to the use of mercurials, but is persuaded to rub upon the legs one drachm of the strong mercurial ointment daily, and to drink one pint of a decoction of sarsaparilla.

12th. "The complaints are not augmented; but if any alteration is perceptible, it is on the favourable side. The ointment and sarsaparilla are continued.

19th. "There is scarcely any efflorescence of the skin remaining; the ulcerations of the gums and tonsils are greatly diminished; the *ophthalmia* is also lessened, though there is some inflammation of the other eye.

22d. "The ulcerations and the *ophthalmia* are nearly well; but as the ointment has not produced any ptyalism, it is continued, and the sarsaparilla likewise. The teeth have acquired a tolerable degree of firmness.

26th. "The ulcerations are perfectly healed, and every other symptom of indisposition has vanished; the teeth have acquired a greater firmness in the sockets, and the remedies were allowed to be suspended."

Dr. Lettsom here observes, that ulcers depending upon syphilis, however difficult of descriptive elucidation, are in general pretty readily ascertained from their peculiar aspect; and from all the observations he was able to make, he did not hesitate in giving his opinion, that the disease described, was the *lues venerea* communicated by the transplanted teeth, which the appearances in the ulcers of the gums, the eruption on the skin, the peculiar *ophthalmia*, the ulcerations in the tonsils, and the whole progress of the treatment and cure, appeared to him to demonstrate.

"Under this persuasion," says he, "as the mercurials were suspended as soon as the ulcers healed, and before the disease was probably totally eradicated, I intimated this suspicion at the time, to the patient; whose strength, however, was so far reduced, as authorised us to interdict mercury at present, especially as he then proposed to take the tour of the southern parts of Europe. I recommended him therefore to procure mercurial ointment, prepared without turpentine, and in case of the recurrence of the disease, to have immediate recourse to this remedy.

"By the time he arrived at Genoa, which was on the 29th of December, about eight weeks after the suspension of the mer-
cu-

rial ointment, the disease again appeared, with ulcerations of the gums, resembling, as far as the patient could judge, the former attack, though in a less degree, owing probably to the immediate application of mercurial ointment to the throat, which in less than a week stopped the disease; after which he used it very sparingly, and concluded his medical regimen with taking a decoction of sarsaparilla; and he has since continued free from disease to the present time, May, 1786, when I procured his assistance in drawing up the preceding relation.

"Whilst I admit the resemblance of this disease to the *lues venerea*, I cannot be insensible of the weight of some general objections, published by a gentleman, whose great discernment is universally admired*; but as I have related the appearances and progress of the disease, the treatment and cure of it, from notes daily taken, my opinion cannot alter the facts, with which the author I have alluded to was acquainted, and of which the reader may decide upon for himself.

"I have remarked, that two teeth, the central incisors, were inserted a week before the external incisor; and the disease throughout its whole progress, seemed to originate from the two former; both of which were very loose, one indeed was ready to drop out of the *alveolus* upon the slightest touch, while the external incisor preserved throughout a degree of firmness that never afforded any alarm, and the ulceration which extended to it was less foul: I suspect, therefore, that the person from whom the other two were extracted, conveyed the *lues*: had the disease originated from the patient, the ulceration would have been less partial.

"With respect to the length of the time, from the application of the cause to the appearance of the disease, I see no well-grounded argument against the supposition I have admitted; as that the syphilitic infection has lain so long dormant, and afterwards exerted its virulence, I have no doubt. Few diseases afford more anomalous symptoms than the venereal, and not one symptom occurred in the present case but what must have been seen in others repeatedly; the colour of the eruption, its accession, duration, and recession; the ulcerations of the tonsils; the *ophthalmia*; and every other circumstance, appeared to me consentaneous to other instances in the *lues*.

"It cannot be refuted, that with the utmost precaution, the scion tooth is still a living tooth, has the principle of life so far preserved as to unite with the vessels of the new *alveolus*; and, consequently, if it retains a disease with the living principle, it may also convey this disease to a body, of which it becomes a living member; but perhaps from the hardness of its texture, and its slow union with the parts to which it is thus nearly allied, it may be longer in conveying the poison which it carried from its original seat; and this

* See Hunter's Treatise on the Venereal Disease, pp. 379, 391, 397.

may remove a doubt which has been raised respecting the lapse of time between the insertion of the tooth and the appearance of the disease.

“ We never have had any instance recorded of such a disease succeeding the insertion of dead, or of ivory teeth; a dead tooth, whether losing its living principle, in its original seat, without removal, or a dead one, inserted into the *alveolus* of another person, acquires a colour and appearance totally different from a living tooth, whether an original or a transplanted tooth. The argument therefore of soaking and cleansing the tooth, constitutes no proof against the probability of communicating the disease, as long as the tooth retains the living principle, capable of forming an union with the parts into which it has been inserted, by a specific medium of circulation, such as exists in the natural state; unless it be contended that the teeth are incapable of retaining the venereal disease, which, however, cannot be argued by any analogy, for the disease seems to be particularly determined to some of the hard bones of the body, as the *tibia*, *cranium*, &c. and sometimes remains latent for years, possessing at the same time the genuine syphilitic powers; but supposing the teeth incapable of retaining and communicating the disease, still the nerves and fleshy parts about them may do it effectually.

“ That this disease should succeed the transplanting of teeth, conveys no censure upon the dentist who performed the operation, as every precaution to obviate such an incident was adopted: the persons from whom the teeth were extracted, were minutely examined by an eminent surgeon, and the transplanted ones were soaked in lukewarm water for about an hour before they were inserted into the *alveoli* of the gentleman.

“ It is certain, however, that instances have occurred with other operators wherein such precautions have not been taken, perhaps from an opinion that the more quickly the transition was made, from extracting to inserting a scion tooth, the greater was the probability of the transplanted tooth fixing into the *alveolus*. ”

It will be hardly necessary to mention, that the sooner the scion is put into its place, the better, as delay will perpetually lose the power upon which the union of the two parts depends. *Hunter on the Teeth*, v. II. p. 102.

“ From what I can collect,” continues Dr. Lettsom, “ in an extensive enquiry into the practice of transplanting teeth, about one in every twenty have had the disease, and of these about one fourth have died. It is true, that in some of these fatal cases, mercury had been used, but it has been in such only, where the patient had been debilitated to an extreme degree, and never where it had been exhibited early, or whilst a good share of strength remained, so far as I know: every person acquainted with practice, very well knows, that in some instances of the *lues* in the common way, the applica-

tion of mercury will not cure; and, indeed, where the cortex and other tonics have afforded more benefit; but such instances are comparatively rare, and form no proof against the general efficacy of mercury in the *lues*.

"As the species of disease I have described has not been noticed in this kingdom above ten years, owing probably to the novelty of transplanting living teeth, I have given my opinion in the foregoing pages with more hesitation; for had it not been for the circumstances attending other patients, who have had similar ulcerations of the gums after the operation, I should not have entertained any doubt of the syphilitic nature of the present case.

"The eminent writer, whose authority I have already noticed, has related several examples, which lead one to doubt the real existence of the *lues* in this peculiar disease of the gums."

Professor Kuhn, of Philadelphia, communicated to Dr. Lettsom the following case of ulceration of the gums succeeding the transplanting of teeth:

"A married lady, in Philadelphia, had two teeth inserted into the upper jaw by a celebrated dentist; these succeeded extremely well. After some time a third was likewise inserted; but this was never perfectly fixed or firm, though for six weeks she felt no kind of inconvenience. She then began to complain of a stricture about the fauces, and some symptoms of a sore throat, with a slight ulceration of the tonsils, which she attributed to cold, and for which she lost about eight ounces of blood from the arm. This not affording her any relief, my attendance was desired: I found the glands in the neck considerably swelled and hard, the gum about the last inserted tooth livid, with a loss of substance, and the tooth itself much looser than it had been for some time; a slight fever accompanied the symptoms, attended with a loss of appetite, and some degree of nausea; after some days, eruptions appeared over the whole body, and particularly on the arms, and in the palms of the hands, covered with furfuraceous scales, which were soon renewed if removed by design or accident. There was no room for even suspecting that syphilis could have been the source of any of the symptoms, and I therefore concluded that the irritation from the last inserted tooth had occasioned the various symptoms of the disorder. The gum was repeatedly scarified, external remedies were applied to the swelling in the neck, to prevent an abscess, which there was much reason to apprehend, and small doses of neutral salts were administered to moderate or relieve the fever. But though her complaints did not grow worse under this treatment, I had, after two months' attendance, the mortification to find them no better, and therefore advised the removal of the tooth, as the only method that appeared to me effectual to relieve the complaints. This, after some hesitation, was complied with; the gum in a few

days healed and became perfectly sound; the swelling in the neck abated by degrees; the eruptions vanished, but so slowly, that it was several months before they disappeared entirely. She took a few doses of bark daily for about a week, to restore tone and vigour to the system, which had been very much impaired by anxiety and distress of mind as well as by the disease."

This subject is further illustrated by the following case, sent by Dr. Hamilton, of Ipswich, to Dr. Lettsom. After some preliminary observations, Dr. Hamilton says,

"A white, and an apparently sound tooth, was taken from the jaw of a seemingly healthy person, and immediately transplanted into the jaw of the lady. Soon after which she began to complain of pain, grew daily worse, ulcers appeared in the gum where it was inserted; these spread, sunk deeper, communicated to her upper and under jaw, fauces, and tonsils; discharged a foetid ichor, and rapidly continued their ravages, till in no long time after, not only the roof of her mouth, but both upper and under lips were consumed; her teeth also fell out, for the *alveoli* became carious, and she appeared a spectacle shocking to behold: she lived some considerable time, however, before death put a period to her misery.

"We are told of the great care taken by the dentists to obtain teeth from sound persons; how the strictest enquiry is made relative to this, before they proceed to the extraction of the tooth; and how, that even when they are fully satisfied on this point, they do not stop here, but proceed further—they soak it well in warm water, and they carefully wipe it clean and dry, before they insert it into the destined jaw.

"I doubt not, but this may be, for the most part, strictly true; and that the generality of dentists scrupulously and conscientiously adhere to this plan, I mean such as have a character they wish to maintain; but it is feared, there may be exceptions, and that there have been those who paid less regard to this necessary precaution.

"The gentleman who favours me with the relation of this case, says, he knows instances where the tooth has been taken warm from the one jaw, and the next moment inserted into that wherein it was destined to remain, without any such precautions as these being observed.

"But the fatality that has attended Sir William Watson's patient, with the fatality of this I have related, and the brink of death on which your own stood, who, I trust by this time, is removed from all danger, will, it is to be hoped, operate so forcibly on the practitioners in this branch, that no possible precaution will hereafter be neglected, that can obviate such evil tendency.

"I would not, from these cases, entirely condemn the practice of transplanting teeth; I am authorised from another correspondent of observation, to assert, that it has been attended with utility. That at the end of five years from the operation, the transplanted tooth

neither shewed signs of decay, nor did pain, or any other evil tendency, to create an alarm, during this period, ever succeed.

“Notwithstanding this, it may be perhaps as safe, not to run the risque for every trifling blemish in this part of the human fabric. A little black speck, of no importance even to beauty, or a tooth not standing altogether so exactly in a row with its fellows, should by no means tempt any one to hazard its removal for another, though more beautiful to the eye, which may in a short time be the cause of disease and pain, if not of death.

“That it is the syphilis, or confirmed lues, which most frequently takes place from this operation, there appears to me some reason to conclude; and this is strengthened, as well from the frequency of venereal taints in both sexes, as from considering what sort of persons they are, who for the sake of a bribe, submit in this way to the loss of their teeth: their ways of life, and other circumstances, give room for suspicion on this head.

“In the case related by Sir William Watson, it yielded to nothing but mercury; the ulcers, after the use of this mineral, soon began to look better; but a proper quantity could not be administered, for the patient’s strength was too far exhausted before the trial was made.”

SECT. V. *Of BOILS and EXCRESCENCES of the GUMS.*

Gum-boils may arise from cold or from external violence, &c. but most frequently they are the consequence of tooth-ach. The complaint begins with pain attending a tumor on the parts affected; by degrees the side of the face swells considerably; the tumor of the gum now begins to point; and if it be not opened, it bursts and gives the patient immediate relief. When the boil is owing merely to inflammation, after the matter is evacuated, the complaint goes off; but when it proceeds from a caries of a tooth, it will continue as long as the cause remains; the tooth therefore ought to be extracted. After the abscess has burst, if the matter continue to be discharged, it may sometimes be dried up by injecting some astringent liquor; but the most effectual method is to lay the abscess fully open, and to heal it from the bottom by dossils of lint. Sometimes abscesses occur of a more obstinate nature, owing to a carious state of the jaw. In that case suppuration ought to be promoted, and the part laid open as soon as matter is formed; keeping the passage open for the discharge, being the only means for effecting a cure.

EXCRESCENCES of various degrees of firmness sometimes grow upon the gums. Some are soft and fungous, while others are of a warty nature. In general they are not attended with pain. They frequently originate from caries of the teeth, or of their sockets; in which case the removal of the decayed teeth, and the subsequent exfo-

liation of the carious part of the jaw, will often accomplish a cure. But when this does not happen, the tumor should be removed as soon as it becomes troublesome, otherwise there may be danger of its ending in cancer. The removal may be effected by a ligature or knife, according as the tumor may have a narrow or broad basis. It is sometimes necessary to use a speculum oris to keep the mouth open. After the tumor is extirpated, the wound should be allowed to bleed freely, to prevent subsequent inflammation. When the hemorrhage proceeds too far, it should be restrained by the application of spirit of wine, or tincture of myrrh, or solution of alum, &c. and should these prove unsuccessful, the lunar caustic will seldom fail of having the desired effect. No dressings can be applied; but for some days after the operation, the mouth should be frequently washed with a warm emollient decoction; and the cure will be afterwards promoted by the application of some gently astringent liquor, as port wine, tincture of roses, &c.

SECT. VI. *Of ABSCESSSES, &c. in the ANTRUM MAXILLARE.*

This disease is *known* by a pain and uneasiness beginning in the cheek, and extending upwards to the eyes, nose, and ears, together with a swelling, which in the latter stages of the disease tends to a point, most frequently in the cheek. Sometimes a discharge ensues between the roots of the back-teeth, when they happen to penetrate the antrum. Sometimes a discharge of matter from the nostrils takes place, particularly when the patient lies on the side opposite to the tumor. The disease may arise from cold, or whatever produces inflammation in general; but the most common causes are violent fits of the tooth-ach, occasioning excessive pain and inflammation of the membranes of the nose and antrum.

The *cure* is performed by giving a free discharge to the contents of the tumor: and this is done in two ways; either by extracting one of the two anterior great molares, which are situated under the antrum, and making a perforation with a round trocar (Plate II. fig. 39), through the bottom of the socket; if this has not been already perforated by the fangs of the tooth or eroded, in which case the matter will pass out immediately after the extraction: or the perforation may be made by the instrument represented at fig. 50, through that part of the antrum which projects outwardly over the molares. As most people wish to avoid the drawing of a tooth, when it does not appear to be absolutely necessary, the perforation is commonly made in the way last mentioned. Some authors, however, object to this, as not giving a sufficiently depending opening to the matter. As soon as the matter is discharged, a plug may be introduced into the perforation, which may be removed frequently to allow the matter to pass out, and to admit astringent solutions of

bark, &c. to be occasionally thrown into the cavity of the antrum. In this way a cure is obtained, if the bones be sound; but if they are carious, it is impossible to expect a cure till the diseased portions of the bone exfoliate and be removed. When clotted blood is formed in the antrum, it is to be removed in the same manner. Sometimes the tumor of the cheek is owing to a swelling of the bones, and no matter is found in the antrum: in that case the operation does harm. No external application has yet been discovered for removing such a swelling, though a long-continued course of mercury has been found to be of some service.

SECT. VII. *Of DISEASES of the TONGUE.*

The tongue is one of those organs of the human body which is but very seldom affected with diseases; and when they do occur, they seem to arise from something of an infectious nature.

Dr. Andrew Ferguson, of Aberdeen, has given, in the Medical and Physical Journal, a very interesting account of different affections to which this part is obnoxious.—“In my practice,” says he, “I have met with three different kinds of ulcerations upon the tongue, called aphtha, sibbenic, and mercurial ulcers; these, I consider as its most frequent morbid affections. Aphtha is a disease most commonly seizing children when they are very young; it is considered as one of the genus of the order exanthemata, accompanied with synochus fever, and little whitish ulcers, which are sometimes distinct, at other times running together, spreading over the tongue and surface of the mouth, attended with pain, and slight swelling of the tongue; when the sloughs are removed they soon grow again: the time of its going off is variable.

“This is the definition of aphtha, and serves very well for distinguishing it; about its causes, however, there are various opinions entertained. Although several of the order of exanthema, are contagious, yet this disease is not mentioned as such; it is, however, said to be attended with synochus; and as most of the fevers of this species are contagious, if we reason from analogy, we must suspect aphtha of being so too. I suppose that aphtha is rather at first a local affection, which has something of a poisonous stimulating nature attached to it, proceeding from a certain morbid condition of the glands of the mammæ: this stimulating ichor, issuing from the morbid glands, and mixing with the milk, I consider as the cause of this ulceration of the child’s tongue. Aphtha does not occur to every child, neither do I suppose such a morbid state common to the glands of every woman: in the first milk of every nurse, there is something of a stimulating nature, which acts upon the child as a cathartic. May not this stimulating quality be increased sometimes, so as to occasion this disease? I have observed before,

that aphtha is at first of a local nature, but when it happens to be violent, it is attended with fever, and universal affection: it descends by the primæ viæ, occasioning violent gripes, diarrhœa, and very often convulsions. This disease always infects the woman's nipples, producing sores very painful and difficult to heal, and which never will heal as long as the aphtha continues in the child's mouth. Are those who have been affected with the aphtha, exempted from, or less liable to be affected with, the small-pox? I ask this question, because, having inoculated a daughter of Mr. Davidson, butcher, in this place, who was violently affected with aphtha when very young, she did not take the infection. Some time after, when I was inoculating four children of Mr. Alexander Sangster, a relation of Mr. D., Mrs. Davidson desired that I should, a second time, attempt to inoculate her daughter. The first time, her arm became inflamed a little, and a small pustule appeared; the second, as a larger wound was made, and a greater quantity of variolous matter introduced, the pustule was large, and attended with inflammation around; yet no eruption appeared upon the rest of her body: the other children who were inoculated with the same matter, had a good many very fine and distinct small-pox. Sibbenic ulcers proceed from a poison similar to syphilis, and are only a modification of it; the same agents which cure the one cure the other. I have noticed this difference, however, that mercury has a more powerful effect in curing sibbens than syphilis; this I suppose to be owing to the difference of the stages of the complaint. I have observed, that in the first stage of syphilis, mercury in general has but very little effect until the poison begins to exert its influence upon the lymphatic system, and has suffered some change in the body. The sibbenic ulcers have a very different appearance from aphtha; they have a broader surface, appear principally upon the sides of the tongue; their surface is whitish, but their edges are swelled, and they look very much like cancerous sores: nothing has so great an effect in removing these sores, as the topical application of muriated mercury, along with the agency of the mercurial pill. Mercurial ulcers are occasioned by mercury, applied either inwardly or outwardly; they want the cancerous appearance of the sibbenic ulcers; have a darker coloured surface in the mouth, and are attended with a disagreeable foetid breath, and a taste resembling that of copper; unless when they are combined with the syphilitic poison, they require very little medicine, except the frequent application of emollient gargles, to which may be added, a small quantity of the sulphuret of potash.

"The tongue is less liable to be affected with inflammation than any of the other organs of the human body, and yet it is more exposed than any of them to the action of stimuli, both of the solid and fluid kind; this must be owing to the structure of its external covering, which seems to be peculiar to itself. The internal substance of the tongue is composed of several muscles, called genio-

glossus, cerato-glossus, stylo-glossus, and lingualis ; the fibres of which are disposed in a longitudinal, transverse, and vertical manner ; they enable the tongue to move in all directions, which is important in the operation of suction, mastication, deglutition, and the articulation of the voice : a defect of the muscles of the tongue produces paraphonia, and several of the species of psellismus. One of the principal uses of the tongue is, to afford the sense of taste ; for this purpose it is covered with numerous papillæ, which, from their appearance, have been distinguished by the names of capitatæ, semilenticulares, and villosæ ; these have a communication with the nerves of the tongue : the capitatæ appear principally upon the basis of the tongue. I have known more than half a dozen of these in several persons' tongues to be enlarged to the size of small peas, without their being even sensible of it ; the great variety of tastes is occasioned by the action of the stimulus of our food, &c. on the papillæ. Some animals, owing to the particular structure of these, have the sense of taste more acutely than the human species.—When the papillæ are diseased, or hurt by the repeated action of violent stimuli and narcotics (such as opium and tobacco), their sensibility is much diminished, and the taste impaired. In peripneumony and catarrh, I have observed that the sense of taste is very much impaired ; and when this is the case, I have found it to be a very good sign.

“ In every universal disease, I make it a common rule to cause the patient to shew me his tongue, and enquire concerning his sense of taste ; this I consider to be very material, when prescribing, as sometimes his acuteness of taste might prevent him from taking certain very efficacious remedies, which often prove more disagreeable to the tongue than to the stomach. Inability to thrust out the tongue, and loss of taste, have been considered as prognostic signs, indicating great debility and danger : these most readily occur in the latter stages of typhus. In the beginning of fever, when the debility of the functions is not so extreme as in the after stages, we often perceive a tremor of the tongue, when it is thrust out : we can form very little idea of the state of the stomach from the appearance of the tongue. What we term a *fur* upon the tongue, is not a certain sign that the stomach is foul. I agree with Dr. Domier in this particular. We often find the tongue foul when the digestion is good, and *vice versa*. Some persons have this *fur* upon their tongues at all times, even from the apex to the base ; others have very clean tongues, who are much troubled with dyspepsia. I am acquainted with a person whose tongue is full of hacks and deep furrows, which intersect it in all directions, and a very deep one in the course of the *linea linguæ mediana* : his tongue is seldom white or foul, but appears of a bright red colour, and he has no other complaint excepting a few rotten teeth.

“ In no universal disease is the tongue so much affected as in fevers, especially when they are long protracted, or attended with putrid symptoms. In typhus and its varieties, from the very beginning the tongue is *furred*. As the fever advances, it turns to an ash-coloured crust, which afterwards changes to a brown. The same appearance of the tongue accompanies several other diseases, such as cynanche maligna, tonsillaris, parotidæa, and scarlatina anginosa. In all diseases where there is great debility, attended with putrescency, the tongue is most affected with *fur*. The cause of this appearance must be debility, and a relaxed state of the surface of the tongue and throat, from a deficiency of excitement; for I have frequently observed, that those who are of a florid colour, and healthy appearance, have generally the surface of the tongue of a redder colour, and cleaner than those who are weakly and pale. The tongue is always of a more beautiful colour at its extremity than its base; and when crust, or *fur*, of any kind appears, the greatest quantity is always at the root of the tongue, where there is generally the least motion. In the morning, after the tongue has been at rest all night, it always looks foulest: nothing serves the purpose of cleaning it so well as its action in mastication, and frequent speaking, which promotes the circulation of the saliva, and removes every collection of foulness that gathers in the mouth. If this should be found ineffectual, recourse may be had to tonic gargles, as the best means of removing *fur*, and preserving a vigorous state of the papillæ. The tongue, at its anterior and under part, has a ligamentous band, called *frænum*, formed of a reduplication of the membrane that lines the inside of the mouth; this seems for fixing and preventing it from making too much motion. When the *frænum* happens to be too near the extremity of the tongue, so that it becomes fixed to that degree that the child cannot put it out, or use it, then the disease, known by the name of *tongue-tied*, takes place. There may be several degrees of this; that which requires manual assistance does not so often occur as is generally imagined, and many times the operation is performed by midwives when there is no real necessity for it.”

When this operation, however, is really required, it must be performed thus: the child being laid across the nurse's knee, the surgeon should open the mouth, and raise the tongue with the two first fingers of one hand, while with the other he introduces the scissors, and divides the *frænum* in the middle, and as far back as is necessary.

To this we shall add a curious case of an unusual affection of the tongue, by the late Mr. Hayes, of Hampstead, communicated to the Medical Society of London.

“ At seven o'clock in the morning,” says Mr. Hayes, “ on the second of January, 1781, I was desired to visit J. Wembridges, of North-end, a very sober, honest, labouring man. As I was not

very well, my assistant went to him, and found him in bed, and received the following account from him and his wife, viz. that he had supped the night before on bread and cheese, and with it drank a pint of porter, and went to bed perfectly well. About three o'clock in the morning he awoke, and looked at his watch to see if it was time to go to his work; but finding it too early, slept again till between five and six. At this time nothing ailed him; he then got up, and went to his work across Hampstead Heath, as usual. In the way *he thought his tongue seemed to swell*, as it really did, and continued to do so till he could hardly be understood when he spoke. My assistant bled him pretty largely, and gave him an ounce and a half of sal catharticum amarum dissolved in some liquid. About eleven o'clock I saw him myself, and found the above account confirmed. His tongue was amazingly swelled, the face exceedingly florid, and a large proportion of blood seemed derived to the whole head. He complained of an insufferable pain in his back and loins, that he could with difficulty sit up while I repeated the bleeding; which I immediately performed, to the amount of sixteen ounces. The pain in the back was somewhat abated by the bleeding, but the tongue was so much swelled, as greatly to impede his breathing; and it was with the greatest difficulty that he swallowed any thing. Warm injections and fumigations were applied frequently to the tongue; emollient clysters were exhibited; the feet were put into warm water; a nitrous saline mixture, with tartar emetic, &c. was given as often as possible. His pulse beat 130 in a minute, and was full, hard, and strong, which determined me in the evening to repeat the bleeding; and I took ten ounces more blood from him. Although he got stools from the first salts, I repeated them on the morning of the third, which operated very well. The antimonial saline mixture had sweated him a little; but the difficulty which he had to breathe, prevented his lying down and encouraging it. I ordered fumigations of vinegar and red port; the clysters and pediluvium to be repeated; but there was not the least abatement of the size of the tongue; and it now began to look of a dark black colour, or rather as if it had been broiled over a smoky fire. Indeed I expected it would mortify. In a case so singular, I confess I knew not what to do; and indeed had I known, there was very great difficulty to get any thing down his throat. I ordered the continuance of the antimonials, and sent him a large blister to put round the whole throat, with powdered camphor spread over it. This was put on for a little time, but had not drawn at all; when some of the neighbours fetched Mr. Goodwin, an ingenious surgeon of this town, to see him, at a time when I was from home. He recommended the blister to be taken off, and a poultice of bread and milk to be applied to the throat, and a large blister between the shoulders. When I came home in the evening the above had been done, but not with the least benefit. On the morning of the fourth

I saw him early, much the same as the preceding night. The blister had drawn, and the poultices had been kept on, and frequently renewed warm. I ordered four grains of James's powder every third hour; saw him in the middle of the day, much the same. At night I was sent for in great haste, and was told he was dying: indeed he had every appearance of being so, except that his pulse was still quick, full, and hard. The James's powder had sweated him profusely, but without any evident benefit. I ventured to bleed him again in this state, and ordered the poultice to be taken off, and the blister to be put round the throat, as I had before directed. As soon as the blister began to act, and to discharge any lymph, the tongue gradually lessened; he breathed freer, the tongue became white and moist, and by the next evening he was out of all danger; and a couple of purges completed his cure. It may not be improper to remark, that he had not the least swelling of the gums, palate, or throat, nor any complaint in the head; nor did his blood shew any large portion of buff; and the serum and crassamentum were proportionable."

Mr. Hayes follows up this singular narrative with a case, in which an old lady, aged 81, rather of a scorbutic habit of body, though remarkably healthy for her time of life, was affected with a troublesome itching that came on her hands, and other parts of her body, particularly at night, after she became warm in bed. This, it appears, was caused by a number of lumps or weals, like those of the *nettle-rash*, which arose upon the skin, and the itching hindered her getting her usual sleep at night, but subsided in the morning, and left a degree of roughness on the skin. One of these eruptions being particularly troublesome to her, she endeavoured to abate the violence of the itching by licking the part with her tongue, by which the latter became considerably affected, though not precisely in the way stated in the preceding instance. For this, and some other interesting communications on these unusual complaints, we refer the reader to vol. II. of the *Memoirs of the Medical Society of London*, p. 193.

SECT. VIII. ULCERS in the MOUTH.

When ulcers of the mouth arise from a general affection of the system, this must be removed before a cure can be expected. When they originate from sharp points on the teeth, these are to be filed off, and some astringent solution taken occasionally into the mouth. Notwithstanding these and other remedies, the sores sometimes become worse, discharging a thin fetid sanies, attended with much pain, and putting on every appearance of cancer. In this situation, *extirpation* is the only thing that can effect a cure. If the sore be only superficial, it may pretty readily be extirpated; but when deep-

seated, it may sometimes be necessary to cut through the whole substance of the cheek, and heal the fore by the hare-lip suture. When the tongue is the subject of operation, the operator ought to be ready to take up the bleeding vessels by the tenaculum or the needle. Along with ligature, it may be necessary to use astringent gargles, or a mixture of vitriolic acid in water. If these fail, the potential or even actual cautery must be used.

SECT. IX. *Of ENLARGEMENT of the TONSILS and UVULA.*

The TONSILS sometimes grow so large and hard as to become incurable, and even to threaten suffocation. The tumors here have been commonly considered to be of a scirrhus nature; but they are neither attended with shooting pain, nor are they apt to degenerate into cancer; neither do swellings return after the tonsils have been extirpated; hence they ought not to be removed till by their size they impede deglutition or respiration; but whenever they do this, they may be removed with safety. The only proper method of removing them is that by ligatures, which are not only void of danger, but seldom fail to perform a cure. If the base of the tonsil be smaller than the top, the ligature is to be used as for polypi in the throat; but however broad the base of it may be, much difficulty will seldom occur in fixing it, for the swelling is always very prominent. In diseases of this kind both tonsils are generally affected; but if the removal of one of them forms a sufficient passage for the food, the other may be allowed to remain. When, however, it is necessary to extirpate them both, the inflammatory symptoms produced by the extirpation of the first should be allowed to subside before any attempt be made to remove the other.

When the form of the tonsils happens to be conical, so that the ligature would be apt to slip over their extremities, Mr. Cheselden has recommended a needle (fig. 45), with an eye near the point: a double ligature being put into the eye, the instrument is to be pushed through the centre of the base of the tumor, and the ligature being laid hold of by a hook and pulled forwards, the instrument is to be withdrawn; then it is to be divided, and so tied that each part may surround one half of the tumor. This method, however, is scarcely ever found to be necessary.

The following curious case of *calculous concretions formed in the tonsils*, has been published by Mr. Hewitt, surgeon, at Hull:

Mrs. H——, aged 39, and of a corpulent habit, about nine years ago, by exposure to cold, was attacked with the usual symptoms of inflamed sore throat. The left tonsil was particularly inflamed, and came to suppuration. In about three months the abscess broke, and discharged matter of a proper consistence. Three days afterwards, the surgeon who then attended her, introduced a

probe, and very distinctly felt a hard, rough substance. On the same day, a stone, of a light yellow colour, and about the size of a small field bean, came from the orifice. She had at this time a child at the breast, eighteen months old. She remained a widow five years; in her sixth year she was married to her second husband, and again became pregnant. Mr. Hewitt attended her during her pregnancy, when she parted with two concretions from the same tonsil, both smaller than the first; but without any previous inflammation or suppuration. She again became pregnant, and parted with a stone as the last. About the month of July, 1799, during her last pregnancy, the glands of her neck were much swollen, but she felt no pain, nor was there any appearance of inflammation. One month, however, after delivery, the left tonsil became very much inflamed, and in a fortnight suppurated. The discharge was considerable for a few days; after which Mr. Hewitt introduced his finger into her mouth, and felt the end of a stone, which, by gentle pressure forwards came into the mouth.

Enlargements of the UVULA, from inflammation or from other causes, may generally be removed by the frequent use of astringent gargles, as of strong infusions of red rose leaves or of Peruvian bark. But when these fail, and the enlargement is so considerable as to give great uneasiness by impeding deglutition, irritating the throat, and so causing cough, retching, and vomiting, extirpation is the only thing upon which any dependence can be placed. *Excision* is the readiest method when the uvula is only elongated; but when the size is considerable, dangerous hæmorrhages sometimes attend this method; on which account a ligature is preferable. The operation may be readily performed by a knife of the common kind; some prefer the curved probe-pointed bistoury.

In performing the operation, the speculum oris (fig. 46) is necessary to keep the mouth sufficiently open, and the uvula should be laid hold of by a pair of forceps or a small hook, so as to keep it firm, and prevent it from falling into the throat. After the operation, if the bleeding be considerable, it may be checked by astringent gargles, or by touching the part with lunar caustic; but this will seldom be necessary.

When a *ligature* is to be employed, it may be readily done according to the method recommended in the extirpation of polypi. A double canula with a ligature may be passed through the nose, or the ligature may be applied according to Cheselden's method in extirpation of the tonsils.

SECT. X. Of SCARIFYING and FOMENTING the THROAT.

In inflammatory affections of the throat, the means commonly employed are gargles, fomentation, scarification, or topical bleeding.

Gargles are useful for cleaning the fauces from thick mucus or other sordes; they may likewise be useful in cases of ulceration. In relaxation of the parts, they are employed to advantage when made of astringent materials. Fomentations may be of some use when externally applied; but the steam of water, &c. drawn into the throat, by means of that excellent invention *Mudge's INHALER*, is preferable. Sometimes it is necessary to draw blood also from the part affected. Here recourse may be had to scarifying with a common lancet, the tongue being depressed with a spatula. It may be still more readily done by the scarificator (fig. 47). After a sufficient number of punctures have been made, the flow of blood may be promoted by the patient's frequently applying warm water to the punctures. When an abscess forms, notwithstanding the use of these remedies, the matter may be discharged with the scarificator already mentioned.

SECT. XI. MORBID CONTRACTION *of the* ŒSOPHAGUS.

This disease has only been treated of by Dr. Munckley, who reckons it one of the most deplorable incident to the human body. Its beginning is in general so slight as to be scarce worth notice, the patients perceiving only a small impediment to the swallowing of solid food: they usually continue in this state for many months; during which, all liquid foods, and even solids themselves, when cut small and swallowed leisurely, are got down without much difficulty: by degrees the evil increases, and the passage through the Œsophagus becomes so narrow, that not the smallest solid whatever can pass through it; but, after having been detained for some time at the part where the obstacle is formed, is returned again with a hollow noise of a very peculiar kind, and with the appearance of convulsion.

The seat of this malady is sometimes near the top of the Œsophagus, and at other times further down, nearer the superior orifice of the stomach. In this last case, the part of the alimentary tube which is above the obstruction, is frequently so dilated by the food which is detained in it as to be capable of containing a large quantity; and the kind of vomiting, by which it is again returned through the mouth, comes on sooner or later after the attempt to swallow, in proportion to the nearness or remoteness of the part affected. In the last stage of this disease, not even liquids themselves can be swallowed so as to pass into the stomach, and the patient dies literally starved to death.

On the dissection of such as have died in this manner, the Œsophagus is found to be considerably thickened; and in some so contracted within, at the diseased part, as scarcely to admit the passing of a common probe: in others, to adhere together in such a manner

as entirely to close up the passage, and not to be separated without great difficulty.

He comes next to shew what he has found to be the most efficacious method of treating this disease, which, though not uncommon, yet in general has been considered as incurable.

He claims not the merit of having discovered the method of cure, but hopes that some service may arise from publishing what his experience has confirmed to him; having first received the hint from another eminent physician.

The only medicine, then, from the use of which he has ever found any service, is mercury; and in cases which are recent, and where the symptoms have not risen to any great height, small doses of mercury given every night, and prevented, by purgative medicines, from affecting the mouth, have accomplished the cure.

But where the complaint has been of long standing, and the symptom has come on of the food's being returned through the mouth, a more powerful method of treatment becomes necessary. In this case he has never found any thing of the least avail in removing any of the symptoms but mercury, used in such a manner as to raise a gentle but constant spitting: and this method he has pursued with the happiest success. If this method be commenced, before the complaint has gained too much ground upon the constitution, the case is not to be despaired of; and of those who have come under his care in this state, by much the greater part have received considerable benefit from it, and many have been entirely cured.

The complaint itself, he observes, is not very uncommon; but there is no instance, to his knowledge, recorded, of success from any other manner of treating it, than that above recommended.

We have the following observations on this morbid affection of the throat in the Memoirs of the Medical Society of London, by Mr. Wathen, an eminent surgeon in London:

"We meet," says he, "with many disorders properly surgical, which admit only of a palliative cure, and others that are in their own nature absolutely incurable. Here the *prognosis*, though a painful and mortifying task, becomes as necessary to be predicted, as in other more agreeable and fortunate cases. But this *prognosis* which results from the *diagnosis*, as an inference from a certain axiom, and which we are obliged in almost every instance not only to form to ourselves, but to communicate to the patient or his friends, requires the greatest caution and prudence. If we foresee the disease will turn out fatal, a limb remain deformed, or a part continue useless, we are under the necessity of making a suitable prediction; but if this be done suddenly or abruptly, we give a shock, which will rebound upon ourselves. If it be not clearly expressed, we are liable to have our words mistaken or perverted; and if not delivered to a proper person, in whom we may confide and trust, as our substantial

evidence, either of the aforesaid events will at length be reflected on the carelessness or incapacity of the surgeon.

“The *constricted œsophagus*, a disorder which of late years occurs, I believe, more frequently than formerly, is one of this class. It is absolutely incurable, except in an early state, and before an ulcer commences; or, in other words, whilst the contraction of the tube is yet simple, with no other thickness or solidity, than what arises from its texture being comprised in a less space than before. I have been consulted in at least forty cases of this kind within the last twenty years, and whatever be the cause, whether the swallowing hot, scalding, or spirituous liquors, from accident or habit, which I think not improbable, its seat is, nine times out of ten, in that part of the canal where it adheres to the back of the *thyroid cartilage*. In this stage, a daily introduction of the bougie, the size of which should be daily increased, and frequently swallowing pills, and at last boluses, of butter and boiled fat, will by degrees dilate the tube in that part. I lately cured a case in this state of the disease, in which Mr. Else was concerned with me. There are some now living, who have been well several years, from the same mode of treatment. I have examined several, who died in consequence of this simple state of the disorder without the least ulceration, the tube being so entirely closed as not to admit the smallest probe; but when the part ulcerates, its cylindrical form is perverted, and *sacculi* are formed, &c. death must inevitably follow. The ulcer in some instances erodes the *thyroid* and *cricoid* cartilages or the *aspera arteria*, or else it penetrates laterally through the coats of the *gula*, through which the food and drink attempted to be swallowed make their way, and suddenly put an end to the patient's misery. I have opened several where these effects, with some others, were truly apparent, and have a drawing of one with a large hole in the side of the *œsophagus*, through which the food escaped into the thorax.

“There is another mortal disease,” continues Mr. Wathen, “which I do not find described in any writings that have occurred in my reading. It is an *ulcer in the ventricles of the larynx*, accompanied with a remarkable hoarseness, and perpetual irritation at the top of the windpipe, which excites a cough: nothing abates this hoarseness, or cough; there is no pain, or soreness in the lungs; it commences in some who are otherwise in perfect health, and continues some years before it brings them to extremities. The cough in time expels real *pus*, which increases more and more; the patient becomes hectic, and dies.”

In the same publication we find the following account of a *scirrhus œsophagus*, related by Dr. Farquharson, of Edinburgh. After observing that the *constricted œsophagus* is one of the most deplorable diseases to which the human body is subject, and though not

uncommon, seldom described by medical writers, the doctor describes the particulars in the following way:

"June 10, 1787. William Glen, aged 44, naturally delicate, of a slender make, remarkably pale complexion, very weak and extremely emaciated, consulted me for a disorder in the œsophagus, about half way between the throat and stomach, which rendered him perfectly incapable of swallowing solid food of any kind; and even caused the most liquid food to be rejected, after remaining some hours in his throat.

"On examination, I found that he had laboured under this complaint, though in a less degree, since the beginning of January, 1787. He gave me the following history of his case:

"January the first, he was seized with a cold and slight fever, to which he was very subject; this confined him to his bed for ten days. When he began to recover, he felt a slight difficulty of swallowing, which he attributed to wind meeting the food in its passage to the stomach.

"For this supposed windy complaint he consulted a druggist of this place, who ordered him some hiera picra infused in brandy; a wine-glassful to be taken twice a-day. This increased his complaints so much, that he left off using it in less than a week; and took no more medicines till after he consulted me. It will not be improper to observe here, that this patient had never found spirits agree with him; but since January last they increased his sufferings very much. He was temperate in the use of every thing, except drinking tea and smoking tobacco.

"From this time he grew daily worse; so that by the end of February every bit of his solid and part of his liquid food was rejected, after remaining four, five, or six hours in the œsophagus. From the time of his swallowing any food to the time of its being rejected, he was very uneasy. He complained of a sense of weight and fulness in his breast, and a violent pain in his back, nearly opposite to the cardia. These symptoms went off after the food came up.

"He was now reduced to the necessity of subsisting entirely on the most liquid food, taken often, but in a small quantity at once; though he could still swallow fresh butter pretty well, and had a great desire for it, yet his poverty prevented him from procuring a sufficient quantity.

"As his food was now seldom retained more than an hour, or two at most, and was thrown up in greater quantities than formerly, he lost his strength and flesh so much, that he began to be alarmed; and for the first time thought himself in danger.

"June 10th he consulted me. I immediately suspected the cause of this disorder, and though I had very little hopes of curing him, as the disease was so far advanced, yet, that I might not seem to abandon him to his fate, I resolved to give mercury a fair trial; which

was the only medicine I had ever seen of use in the like circumstances. As I judged it necessary to produce a gentle salivation as quickly as possible, I ordered him three grains of calomel, and one grain of opium, every night at bed-time, with a laxative occasionally, to obviate costiveness. At the same time I ordered him to be fed with milk or rich broth, a good deal of fresh butter, and a little wine daily.

"In about ten days he began to spit gently; and in about a month more I was agreeably surprised to find him so much relieved, that he could swallow liquid food without difficulty, and got over even solids, when cut small and well chewed. Neither solids nor liquids were now rejected. The pain in his back, and sense of weight and fulness at his breast, had gone off; and he began to gather flesh and strength, so that I had every reason to look for a perfect cure.

"As he now salivated freely, I ordered him to omit his medicines every other night, to guard against cold, to live on the most nourishing diet he could procure, and to increase his ordinary quantity of wine. However, he unluckily exposed himself in a rainy day, and got a rheumatism in his thigh. This, and the idea of his being out of danger, made him give up his medicines entirely; and I heard no more of him till the 25th of September, when he was admitted into the General Dispensary at Paisley.

"Mr. White, one of the surgeons, examined him with me. We found things had taken a surprising turn for the worse. All his complaints had returned with greater violence than ever; his inability of swallowing, even liquid food, had increased; and every thing he took was rejected in a shorter time than formerly, with a particular gurgling noise. He had pain, as well as the sense of weight and fulness at his breast; and the pain of his back was now constant and more severe. The dilatation of the upper part of the œsophagus was plainly perceptible; he was extremely weakened and emaciated. He never had a stool without a clyster or a laxative; and it was with difficulty he got down as much of the laxative as kept his body open. His pulse was regular, but weak; and his breathing was not at all affected. He informed us, that his complaints had returned in a short time after quitting his medicines, and immediately after his salivation ceased.

"In this situation little could be expected from medicines; however, we ordered the calomel and opium to be repeated, and *zij* of mercurial ointment to be rubbed into the pained part of his throat every night at bed-time, with some decoction of woods after it, and a laxative occasionally. We likewise ordered half a pint of wine, and a clyster of mutton-broth daily. At the same time we gave particular directions about feeding him.

"Notwithstanding all our endeavours, his disease gained ground

daily; so that by the middle of October every particle of his food was rejected in a few minutes, mixed with a great quantity of mucus and saliva. His weakness and emaciation were now so extreme, that he could not move off his back; and for some days before his death he was generally in a state of stupor, unless he was spoke to; yet he still expressed a desire for food; and his breathing was not in the least affected, as the day before his death he slept with his mouth shut, and without a pillow, in his ordinary manner. We now ordered the broth clysters to be repeated thrice a-day, without any effect; for on the 27th of October he expired without a struggle, absolutely starved to death."

Mr. Thynne, one of the surgeons of the Dispensary, opened the body and discovered the following appearances:

"The emaciation was extreme; not a particle of fat was to be seen; and even the muscles themselves seemed to be wasted.

"On laying bare the œsophagus, we perceived about six inches of it, beginning a little below the pharynx, much dilated; and about two inches and a half from that, to near the cardia, perfectly scirrhus.

"On cutting it open, we found the coats of the dilated part much thinner than ordinary; the inner coat was extremely smooth, and perfectly free from ulceration. This part of the œsophagus contained a great quantity of mucus and saliva, with a little of the aliment, but no pus.

"The scirrhus portion of the œsophagus was completely impervious, and afforded considerable resistance to the small blade of a probe scissars, with which it was cut open. The coats of this portion were imperceptible, being confounded in the scirrhus mass.

"The stomach shewed no appearances of disease; only the coronary vein was uncommonly large, and much distended with dark-coloured blood. There was a great quantity of a fluid in the stomach, which appeared to be principally bile and mucus.

"The intestines, liver, gall-bladder, pancreas, and spleen, were in a natural state.

"The substance of the lungs was remarkably white; and the smallest ramifications of the veins appeared as if they had been filled with a black injection. Both lobes, but particularly the right, adhered strongly to the pleura.

"The heart was not larger than that of a child six years old, yet it seemed perfect in all its parts, and the arteries and veins connected with it were of the ordinary size; but their coats were remarkably white and thin. There was no water in the pericardium, or sacs of the pleura."

In an engraving subjoined to the case, a representation of the diseased part of the œsophagus is given. See *Mem. Med. Soc. of London*, vol. II. p. 371.

In treating on these miserable cases in which so little can be done by any of the remedies of which mention has yet been made, we can by no means pass over the trials made by Mr. Home of the caustic, applied in the same manner as in strictures of the urethra. To this attempt Mr. Home was encouraged by attentively considering some cases of contracted œsophagus which had fallen under his notice, and in which he was able to ascertain to his own satisfaction a strong resemblance between that disease and the stricture of the urethra in which the caustic had been applied with so much benefit. We extract the two last of the cases related in Mr. Home's Practical Observations, as best calculated to shew how far this remedy promises to be advantageous.

CASE I. "A gentleman, aged 43, of a very irritable habit, extremely nervous, and readily agitated by casual occurrences, in March, 1796, had, for the first time, a difficulty in swallowing, which increased gradually, and was attended with symptoms of great irritation; as quick pulse, hot skin, fits of choking, sickness, and bringing up great quantities of mucus from the stomach. In this state the bougie was had recourse to; and although the point of the bougie passed through the stricture, it rather increased the irritation. Its use was persevered in for six weeks; but the complaint became so much worse in that time, as to raise apprehensions respecting the patient's life. Under these circumstances he came to London in June, 1796, attended by his surgeon, to see what chance there was of the use of the caustic affording relief.

"At the time I saw him he was in a state of great irritation, with a quick pulse, hot skin, great hurry of spirits, almost approaching delirium; his voice not reaching much beyond a whisper, a great degree of impatience in his temper; and any attempt to swallow attended with convulsive spasms in his throat, and at those times a great deal of phlegm was discharged. The stricture was situated nearly behind the middle of the thyroide cartilage; it did not admit the end of a bougie, the diameter of which was five-twentieths of an inch. As he could not live in his present state, all risk was out of the question, and the only thing to be considered was, whether there was a chance of relief from the caustic. I did not hesitate in giving a decided opinion, that the caustic was not likely to aggravate the present symptoms, and that it was highly probable it might remove the obstruction. From these assurances; the patient very willingly submitted to its being tried.

"The caustic was applied by means of a bougie, in the same manner as to a stricture in the urethra. The common bougie was passed down to the obstruction, and while there, the part opposite the cutting edge of the front teeth of the upper jaw was marked, to determine the exact distance of the stricture; this bougie was then withdrawn, and the curve it had taken carefully preserved. The

same curve was given to the armed bougie, upon which the exact distance was marked; it was then introduced, and the caustic allowed to rest for about half a minute against the obstruction: it gave little or no pain, brought on no local inflammation, and in the course of the day there was less spasmodic affection of the œsophagus when he attempted to swallow. This gave encouragement to repeat the use of the caustic, and it was applied four times, once every other day, each application gave evident relief.

"After the fourth application, he could swallow fluids without any difficulty, and could get down morsels of meat with more ease than he had done since the beginning of his illness. The armed bougie did not pass through the stricture, there was therefore no reason to believe that it was wholly destroyed; but the confinement to the house in London, in addition to the effects of the caustic, brought on a fever, which made it necessary to discontinue the use of the caustic; the fever went off in a week, and he swallowed with little difficulty, had less phlegm collected in the œsophagus, and his voice was more distinct. It was thought right to attend to his general health, and with that view he went immediately into the country, where he recovered strength, and was able to walk two miles without fatigue. He went to the sea in the autumn, in which situation his health was still more improved. He did not attempt bathing.

"He returned to London in March, 1797. He had not lost any ground respecting his swallowing since the caustic was used, his voice was more distinct than last year, his fits of choking less frequent, and the quantity of phlegm collected in the œsophagus not so great as before, although he was still sometimes liable to it.

"It is remarkable, that whenever he was sick and retched to vomit, there was no difficulty in bringing up the contents of the stomach, that action relaxing the stricture.

"With a view of relieving his complaint still further, which it was not thought prudent to attempt in the state of irritation that he was in the year before, the caustic was again applied. I now ventured to employ the lunar caustic of the full size, in which the sticks are cast for the common purposes in surgery, which is more than double the size of that I had formerly used, the bougie was of necessity also much larger. The caustic was first applied on March 18th, it gave no violent pain; but the sensation produced by it remained for half an hour, and then went off. On the 22d it was repeated; he had caught a cold, which at that time was very general in London; this increased the quantity of phlegm formed in his mouth and throat, but did not prevent us from prosecuting the use of the caustic. The 24th the armed bougie passed through the stricture, and immediately some thick phlegm was brought up, which appeared to have been lodged in that part of the œsophagus. 25th, He swallowed considerably better, and his voice was distinctly

louder than common ; this was evident to all his friends. 26th, The application of the caustic was repeated, and the armed bougie again went through the stricture. Having gained so much, I did not think it prudent to attempt further enlargement till it should be ascertained, after leaving the parts sometimes to themselves, that it was absolutely necessary ; and he went into the country, London not agreeing with his general health, and his cold being rather increased. I have since heard, at several different times, that he continues better than he was at the time he left town, and swallows very comfortably.

CASE II. “ A gentleman, aged fifty-four, for twelve years felt occasionally a pain in his stomach, and in the last two years of that period the returns became more frequent, attended with violent retching, without bringing any thing from his stomach but phlegm. In November, 1795, after a very severe attack of this kind, he found a difficulty in swallowing morsels of the usual size ; this increased so much, that in March, 1796, he was unable to swallow meat. In June the difficulty was so alarming as to require medical assistance. On the 20th of June, a bougie, smaller at the end than the point of the little finger, was passed into the œsophagus : it met an obstruction behind the cartilages of the larynx, but was pushed beyond this tight part. It was passed regularly for thirty-two days, but did not produce the smallest improvement in the act of swallowing. On July 18th, he put himself under my care ; at that time he could swallow liquids a little at a time, but even this required caution ; bread and butter, and sopped bread, were often got down with more ease than liquids. He swallowed better at one time than at another, and could tell from his feelings, without making the attempt, whether he could swallow better or not. He was subject to occasional fits of irritation, and at these times brought up a great deal of mucus and phlegm. As the bougie had failed, I proposed the use of the caustic, to which he readily consented. The curve from the mouth to the œsophagus was ascertained by passing a bougie of a large size down to the stricture ; an armed bougie was then moulded into the shape in which the other came out ; it was passed down to the stricture, and allowed to remain there some seconds ; it gave no pain, brought on no irritation, and he swallowed some water immediately afterwards with more ease than usual ; next day he eat one morsel of roasted veal without difficulty. 20th, The caustic was again applied for half a minute ; the pressure made use of gave pain. He swallowed some water immediately after, and got down two gulps at once, which he remarked he had been unable to do before. 21st, He eat a small piece of mutton, and thought he swallowed better : 22d, the caustic was applied for a still longer time ; he drank some water, which readily passed the stricture, but stopped somewhere near the stomach, before it wen

into that viscus: 24th, the caustic was repeated, and gave less uneasiness: 27th, the armed bougie passed through the stricture, to which it had now been applied five times. August 1st, he swallowed tolerably well, but the food met with an obstruction near the stomach, which was now so much increased, that the morsel was forced up again.

"I attempted to pass a long bougie down to this obstruction near the stomach, but it was too large to go through the first stricture: 3d, the caustic was therefore again applied to the first stricture; when he swallowed gently, the morsel got into the stomach, but any hurry brought on spasm near the cardia, which made him retch and bring it up again: 4th, this stoppage at the orifice of the stomach had been so great, as to prevent any thing getting into the stomach, although it readily passed down to that part.

"This led me to believe that there was a disease near the orifice of the stomach, of which the stricture in the œsophagus was only a consequence, similar to what happens in the urethra; a stricture near the neck of the bladder, producing a contraction in other parts of the canal. As this disease, of whatever kind it might be, was out of the reach of surgery, I desired the assistance of a physician, and Dr. Pitcairn was called in.

"It was proposed that a blister should be applied to the pit of the stomach, and that the patient should go through a course of mercurial frictions, using nutritious broth clysters. For two or three days he could not swallow at all; on the ninth, some food passed into the stomach, but it could not be retained there. 12th, He was able to retain twelve ounces of asses-milk, given in small quantities through the day; his pulse was more regular, but very weak. While the gums were sore from the mercury, he thought he swallowed better, and worse when the effects of the mercury went off.

"September 1st, he grew weaker; the use of the mercury was therefore left off. He now retained scarcely any thing upon his stomach, and that principally wine: he brought up occasionally a great deal of mucus mixed with matter.

"On the fifth of September he died. This happened in the country, and the nature of the disease in the stomach was not permitted to be ascertained by an examination after death."

The following cases of Dysphagia, illustrated with engravings, occur in vol. IV. of the Medical and Physical Journal.

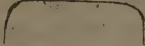
CASE I. Is an account of the dissection of a woman, aged 65 years, who had been subject, for five years preceding her death, to a sickness and retching, and a sensation of pain in swallowing in the track of the spine and œsophagus.

Before her death this lady, for the last fortnight, scarcely swallowed any thing. For about that time too, the spitting and expectoration of mucus had stopped. She was incapable of speaking for

the last four or five days, but retained her senses to the last moment, though her pulse had not been perceptible for two days.

"Upon laying open the cavity of the abdomen, and feeling in the region of the stomach, we were struck," says Dr. Helsham, who communicates the particulars, "with the appearance of some protuberant swelling behind it; but as we wished first to make a careful examination of the track of the œsophagus, we proceeded to the examination of the thorax and neck, and dissected the œsophagus and stomach carefully out from their situation; previous to which a probang was passed down into the stomach, which met with no impediment whatever.

"When the stomach and œsophagus were dissected out, we laid them open, and not the least vestige of disease, neither stricture, schirrus, ulceration, or even abrasion of the internal coat, appeared in either.

"We now sought for the enlargement which occasioned the particular feel behind the stomach and viscera. This was no other than the spine itself, which formed a ridge from the neck to the last vertebræ of the back, and had more the feel of the spinal processes of the back than the bodies of the vertebræ. Instead of the usual form of the bodies of the vertebræ, as thus  the following was the form of them:



and the depth of the cavity, from the middle of the bodies of the vertebræ to the posterior arch of the ribs, was at least five inches.

"The protuberance was greatest about the seventh vertebra of the back, where the œsophagus passes through the diaphragm. The liver and all the viscera appeared sound, the omentum was very thick and large, but did not appear schirrous. There were two biliary concretions in the gall-bladder the size of a large nutmeg each."

Dr. Helsham asks how far will this particular form of the spine account for the symptoms she had been subject to for five years?

CASE. II. "R. C. esq. aged 79, had been affected for twenty years with dysphagia, which was supposed to have been first occasioned by his eating a morsel of hot pudding, which by excoriating the inside of the œsophagus, might have given rise to stricture, or a fungous excrescence on the part.

"For the last two or three years of his life I had frequent opportunities of being at table with him, and from the observation I then

made on his manner of swallowing, and what I saw during the week preceding his death, I could by no means think that either stricture or fungus sufficiently accounted for it.

“Exclusive of the difficulty of swallowing, in the first instance, he would some time afterwards (perhaps ten or fifteen minutes) regurgitate part of his food or drink back again, which seemed to have lodged somewhere in the passage.

“Excepting the difficulty of swallowing, he had enjoyed a very good state of health, was of a fair, florid complexion, and rather inclining to corpulency.

“In January, 1792, the difficulty of swallowing increased to such a degree, as almost totally to prevent any nourishment being received into the stomach; and, for the last ten days of his life, he was supported by broth clysters, and at length gradually sunk from inanition.

“During the last week of his life he would frequently, to appearance, swallow more than four ounces of liquid at a draught, which would remain sometimes for five or ten minutes, and then be regurgitated.

“Permission being obtained to open the body; after removing the larynx, pharynx, trachea, and œsophagus, an enlargement or protuberance of the body of the fifth vertebra of the neck, which projected above half an inch over the body of the sixth vertebra, appeared to be the original cause of the complaint, by producing the stricture in the œsophagus. This bony projection did not shew any mark of disease further than its enlargement.

“The effort of swallowing had gradually produced a dilatation of the pharynx behind the œsophagus, and underneath the projecting body of the vertebræ, forming a sac which would contain about four or five ounces, into which part of the food or drink escaped, and remained for some time, till by its irritation it produced an effort to reject it.”

CHAP. XVII. OF THE DISEASES OF THE EAR.

Imperforated meatus auditorius.] SOMETIMES a thin membrane is spread over the mouth of the external passage, while at other times a considerable part of the passage is filled up with a fleshy looking substance, occasioning deafness. When the first circumstance occurs, the skin is easily divided by a simple incision, and the accretion of its sides may be prevented by a doffel of lint or a bit of bougie inserted between the edges of the wound, and daily cleaned and returned till the part be rendered callous.

When the other cause is present, the incision must be continued considerably deeper, till the resistance be removed, or till the instrument reach near to the membrane of the tympanum, when the

operator should desist, lest the membrane should be wounded: then the same kind of treatment may be followed as in the former case. The proper time for performing the operation is when children usually begin to speak; for previous to this the patient may be too weakly to bear it, and if too long delayed, the speech would be impeded.

Sometimes the meatus externus is entirely wanting in the temporal bone. For this an opening through the mastoid process has been proposed; but the operation has not been performed, at least in this country.

Extraneous bodies in the ear.] Children sometimes push *hard bodies* into the ear, or different kinds of *insects* occasionally creep into it, so as to cause considerable uneasiness. Substances lying near the outer end of the passage may generally be extracted by the small forceps represented in Plate II. (fig. 48.); but round, hard bodies situated deeper in the passage are more readily removed by a *crooked forceps*. When insects are deep seated in the ear, they ought first to be killed, by filling the passage with oil, or any other fluid which proves noxious to them, without hurting the tympanum. They may then be washed out by injecting warm water frequently by means of a syringe.

Deafness from wax.] The accumulation of wax is one of the most frequent causes of deafness, and it may be readily detected by looking into the ear in a clear sunshine.

Various methods have been proposed for removing wax from the ear; but one, not inferior to any, is to throw in frequently, by means of a common syringe or bag, some warm milk and water, or water in which a little soap has been dissolved. Assistance may likewise be given here, by using along with the injection a blunt probe or fine hair pencil, by which the bottom of the passage may be cleared out. After the wax is removed, the patient ought to guard against the effects of cold by introducing a little wool for some time into the meatus. When deafness is owing to a *deficiency of wax* in the ear, a little oil of almonds, or even oils of a hotter nature, or soap, or galbanum, &c. have been of service.

Running from the ears.] Purulent matter is now and then formed in the ears of adults, but oftener in those of children. Sometimes it is produced by ulcers situated in the lining of the meatus, or upon the membrane of the tympanum. It seems to be merely a local affection, and does not, as many have supposed, originate from a morbid state of the system. The remedies best calculated for removing it are such as are of a moderately astringent nature, as a weak solution of vitriolated zinc. A little of this may be dropped in two or three times a-day, but it is still better to use a syringe. If the discharge has continued long, it may be proper, in

addition to the other applications, to keep open a small blister for some time in the neck, arm, or wherever it may be thought most convenient.

In scrophulous habits, *suppurations* sometimes occur in the neighbourhood of the ear, and penetrate into the external passage, or into the tympanum itself; after which it is not unusual for the small bones of the ear to lose their connecting membrane, and to be discharged along with the matter, and for caries to ensue in the tympanum; in consequence of which a high degree of deafness is produced, which can never be removed. In such a situation little else can be attempted than to preserve the parts clean and free from smell, which is readily done by injecting a little warm milk and water morning and evening by means of a syringe (fig. 54). If neglected, the matter from the carious bones is apt to become offensive; and it commonly continues till the diseased parts are either dissolved and discharged, or probably during the life of the patient.

Deafness in old persons.] It sometimes happens, particularly in old people, that, from exposure to a stream of cold air, the tympanum becomes affected, and a noise is heard by the patient like the rushing of water. In other cases the patient is incapable of accurately distinguishing the words of some persons speaking in a loud tone of voice; or, in mixed companies he hears only a confusion of sounds. Complaints of this kind frequently originate from a relaxation of the soft parts of the tympanum; and though a complete cure is not easily performed, yet considerable advantage is sometimes derived from the use of hot stimulating oils, and from keeping the part warm at the same time with a little wool. When deafness arises from affections of this nature, some assistance may be derived from collecting the sound, so as to make a stronger impression upon the internal ear. A variety of instruments have been invented for this purpose. Some use a well-known convoluted tube called an ear-trumpet; others a sort of cup (fig. 49), which is concealed under the hair, and fixed to the head with springs.

Affections of the Eustachian tube.] Besides the affections which may arise in the meatus externus, and may be the cause of deafness, others may occur in or about the *meatus internus* or Eustachian tube, which may have in part the same effect, though by no means in the same degree. Inflammation and its consequences may originate in the cavity of the tube, or swellings or ulcers in the throat may affect it so as to cause some degree of deafness. When this is the case, it is practicable to introduce a pipe (fig. 50), crooked at the extremity, through the mouth or nose, and then to inject into the mouth of the Eustachian tube any mild fluid which may be thought fittest for the purpose, though too great dependence should not be placed upon the attempt.

In the Memoirs of the *Medical Society of London*, Dr. Sims has

clearly shewn the marks by which deafness is known to proceed from an obstruction of the *Eustachian tube*. These are, 1st, Its being preceded by some of the causes already generally known, such as *coryza*, enlargement of the tonsils, *aphthæ*, a want of secretion in the parts, &c. 2dly, When on an effort to expire, and at the same time retaining the breath by stopping the mouth and nose, no pressure is found upon the *tympani* of both ears. For if the tube be free, and the effort very considerable, the pressure is so great as to be attended with pain, and to endanger the rupturing of the *membrana tympani*. And here the doctor remarks, that a pressure upon the *tympanum* of one ear is not sufficient, unless that pressure be observed in each of the ears at different times, a thing not likely to happen. 3dly, The sound of the deaf person's voice appearing dull, or otherwise different from what was usual before, and also from the sound of any other person's. This, however, is only remarkable where both tubes are stopped, as where one only is affected, the person's own voice is heard as well as formerly. 4thly, There seems always to be a noise heard by the patient, as if in his own ears. This sometimes resembles the hissing of a tea-kettle before it boils, at others it is a roaring like water, or like high wind blowing through trees, or even like thunder. This noise is heard when one ear only is affected, though perhaps not in the same degree. What may be thought to militate against this opinion, is the common experiment of stopping one or both ears, which immediately causes a sounding in the head of the kind just mentioned: but it is to be considered, that in this case air is included between the finger and membrane of the *tympanum*, a thing which can never happen in diseases of the external *meatus*, but is precisely what happens in obstructions of the *Eustachian tube*. 5thly, Persons deaf from this cause hear better in a carriage, or in any considerable noise. Dr. Sims is aware that this has been attributed by some to the tension given thereby to the muscles of the small bones of the ear; whether this, however, be not hypothetical, must be submitted to physiologists. 6thly, When one tube is obstructed, the hearing is much more impaired in proportion than when the external *meatus* of only one ear is stopped. This, however, is not to be understood of the sound of the patient's own voice, which is perceived equally as before. And the doctor is led to conclude, that in all cases of deafness, where one or both tubes remain open, and when the internal parts of the ear are not disordered, persons affected with this malady hear their own voices as well as formerly, and therefore we find them always speaking in a lower voice than other people.

"After all I have said, however," continues Dr. Sims, "of the distinguishing marks of the different species of deafness, there are cases where it is very difficult to decide. And in many it appears evident that both the tube and the external *meatus* are affected, which is no more than what we perceive in diseases of most other

parts of the body; the parts in contiguity and connected with them becoming frequently affected.

“ According to the different causes from which the obstruction of the tube arises, the consequent deafness is curable or otherwise. Where it is owing to any glutinous matter stopping the passage, or a simple swelling of the membrane which lines it, or a tumor in the neighbourhood, it is plainly within the reach of the medical art. To these causes I shall therefore principally refer in what is to follow.

“ When it is slightly infarcted with this matter, the first and most simple way in which it is freed from it is by the action of swallowing. This seems to produce its effect by putting the anterior cartilaginous and membranaceous part of the tube in motion. That this part of the tube is moveable, or at least contractible, all authors agree; and any person who will carefully attend to his own feelings, will perceive a peculiar sensation in his ear in performing deglutition. I have often found that a slight obstruction in my ear has been removed by this effort, and therefore whenever I perceive the hearing stopt with a little ringing in my head, I, as it were, mechanically perform it. Others, I doubt not, have experienced the same, though without taking notice of it, or knowing whence the benefit arises.

“ Gaping, yawning, and gargling, have all been known to cure it, and probably act in a similar manner to the last.

“ Whatsoever forces a current of air into the tube, often removes deafness; and this will have its effect whether the disorder proceeds from viscid matter, as in the last case, or from a swelling and puffiness of the *mucous* membrane. In the action of bawling or speaking very loud, the air is forced out of the *thorax* with impetuosity, and though part of it finds a vent through the mouth and nose, yet some of it will pass into any cavity that will admit of dilatation, which is the case of the *tympanum*, the membrane of which may be protruded considerably outward. Coughing has a similar and more powerful effect, and sneezing still a greater; these have been therefore known often to give relief. The action of vomiting falls likewise under this head, although at first the propriety of placing it here may not be evident. It is, however, a compound action, for we not only evacuate the stomach, but at the same instant force the air out of the lungs with great violence, to prevent, I suppose, any of the matters then passing over the top of the *larynx* from dropping into the *aspera arteria*. Another species of effort has been said to cure this complaint, and may, I think, be ranked here, although the connection be less apparent than in the former case, that is, retention of the breath. After retaining the breath for any considerable time, we are obliged almost convulsively to expel it, the effect of which latter action has, I apprehend, been confounded with the former, by those who have recorded its usefulness in this disease.

“ I have already mentioned that a swelling of the membrane which lines the inside of the tube will cause deafness. This besides may produce the former cause by thickening the *mucus* secreted there, as we mostly see in inflammations of glandular parts. Whatsoever therefore astringes this membrane, or even the parts in contiguity with it, may be of service. It is in this way that gargles may have cured the disease. Unloading the vessels of this membrane is also evidently a natural and efficacious mode of cure. This may be accomplished by cupping, blisters, or issues, in the neighbourhood, or by producing general depletion by purgatives, all of which modes have been sometimes successful. Under this head may also be arranged the advantage often perceived from wearing a flannel cap, or other warm covering of the head at night. These latter remedies may likewise be combined with those in the former paragraph, inasmuch as the lessening any swelling of the solids will make the obstructing matter more easily removed.

“ Syringing the external ear may sometimes have been of service from the effect of applications never being confined to the part alone which they touch, but being propagated to the contiguous ones, especially those parts immediately connected with them.”

The last mode of cure noticed by Dr. Sims, is that by injections into the tube, either from the mouth or nose. The injecting from the mouth he thinks rather impracticable; but from the nose it has beyond a doubt sometimes succeeded. On this subject we are referred to Mr. Wathen's paper in the forty-ninth volume of the *Philosophical Transactions*.

Having noticed the various methods that have sometimes been successful in the cure of this disease, of which the simplest, and apparently the most certain and powerful, is the mode of injection, the doctor speaks of the method preferred by himself, in the following way:

“ All the other modes of cure mentioned,” says he, “ evidently fall short in power and efficacy of the one mentioned (in a case before related), I shall therefore content myself with laying down such further directions as I have since found useful in the prosecution of it. Perseverance in repeating the efforts is very requisite in this way, in the same manner as we see in reducing hernias, or in child-bearing, a number of efforts succeed, any one of which singly appears of no service whatever. Considerable force is likewise requisite; indeed, I always order the force to be increased until the air is found to rush against the *membrana tympani*, and, by forcing it outward, to give pain. In cases where only one ear is originally affected, I think it best to stop the other one externally with wax, or some other soft adhesive substance, whilst using the efforts to expel the breath, lest their violence might rupture the membrane of the *tympanum* of that ear in which the tube is free, or at least give it considerable and unnecessary pain. Where the deafness has been of long standing, if the efforts made in this way do not succeed at

first, I think it best to have recourse to blisters, or some of the methods mentioned in a preceding paragraph for emptying the vessels of the tube, after which the efforts are renewed at times with superior efficacy."

These hints of Dr. Sims, induced Dr. Zencker of Berlin to communicate a few observations on some species of deafness, which he had successfully treated, and which were communicated to the Medical Society.

"I take the liberty," says he, "of offering an observation taken from the late Mr. Schmucker's (a famous German surgeon) collection of chirurgical works relative to this kind of disease.

"A man living in Silesia was for a long time deaf of both ears: all remedies applied by a skilful physician having proved ineffectual, he was left without relief, bearing his misfortune philosophically. An inflammatory swelling afterwards rose at the mastoidæal processes of each temporal bone: poultices and a gum plaster were applied; fluctuation was felt; and, after opening, a good pus was discharged; two days afterwards the pus became thin and ill coloured, the surgeon discovered, with a probe, the bone naked and rough: the next day a decoction of bitter herbs was injected, and the injected matter partly came into the mouth: and in repeated trials still more freely; the injection was carried on; four or five days after, the patient could hear a little; the power of hearing increased every day; a fortnight having elapsed, he could hear perfectly at that ear, and the wound soon closed. Encouraged by the success attending this case, the surgeon, on the patient agreeing to his propositions, cut through the skin covering the mastoidæal process of the other temporal bone, and penetrated with the perforating trepan the external bony lamina covering the mastoidæal cells: the above-mentioned injections were had recourse to, which also found their way through the eustachian tube to the mouth; the patient soon began to hear likewise at that ear; and a fortnight after the hearing of this ear was as well as that of the other, and the wound was healed up."

Dr. Zencker adds the following remarks:—"The organ of hearing," says he "may be divided into the external and the internal part, separated by the tympanum; in either may reside the cause of the loss of hearing. Thick ear-wax in the meatus auditorius externus may easily be removed, and hearing restored; but various and very obstinate are the affections of the internal ear, that is composed by the cavum tympani cohering with the mastoidæal cells and the Eustachian tube, by the vestibulum, cochlea, and canales semicirculares." Mr. Cruikshank cautiously destroyed the tympanum, malleus, and incus, in dogs; notwithstanding which, they retained the power of hearing. From thence he infers, that, when the stapes remains at the foramen-ovale, and the auditory nerve is unhurt, the sense of hearing will continue, though lessened; but if the stapes,

nerve, vestibulum, cochlea, and canales semicirculares, are destroyed, there is an irrecoverable loss of hearing."

Some think Mr. Wathen's method of injecting into the tube by the mouth or nose, can very seldom be applied. Indeed, few patients can suffer the tickling of the nose produced by the pipe of the syringe; and even the most skilful surgeon will sometimes miss the opening of the tube. But the injection by the mouth seems to us most free from these difficulties.

We have already noticed the impossibility of applying a remedy in cases of organical deficiencies in the apparatus of hearing. The following instance of original deafness, however, with the appearances on dissection, by Mr. Haighton, also published in the Memoirs of the Medical Society of London, are worthy of being considered by every surgeon.

The patient died when he was about thirty years of age. Having been deaf from his birth, he was consequently dumb. He possessed, as might be expected, but little originality of genius, and his intellectual powers were very limited; but he was not destitute of talents for imitation.

These were the appearances on dissection. "The brain, which was carefully examined, exhibited nothing peculiar; nor did any thing worthy of notice occur, until, in the order of examination, we arrived at the seventh pair of nerves, which, from its function, is called *auditory*.

"This nerve consists of two portions, one of which is called *portio dura*, from its firmness; but its connection with the sense of hearing is somewhat remote; the other is called *portio mollis*, and is very properly considered the true auditory nerve. This last portion was remarkably small; it did not appear to be half its usual size; but the *portio dura* seemed in every respect natural.

"Having taken out the temporal bones in order to examine the parts more at leisure, we found nothing preternatural in the meatus auditorius, membrana tympani, the cavity of the tympanum, or the two apertures leading from it, viz. the Eustachian tube, and the communication with the mastoid cells. The figure of the four bones of the tympanum was natural, and their relative situation very proper. The first of them, called *malleus*, was attached as usual by its manubrium to the membrana tympani; and the last, called *stapes*, had its basis resting on the entrance of the vestibulum, called fenestra ovalis.

"Every appearance hitherto was natural.—The sole cause of deafness was found in the labyrinth.

"This part of the organ, consisting of the vestibulum, cochlea, and semicircular canals, was perfectly formed; but instead of containing water, was filled with a solid caseous substance. This, which was the only preternatural appearance, will be very sufficient to explain the case, when we consider the economy of this organ."

The author remarks, that, "The organ of hearing, instead of being divided into external and internal, may, perhaps with more propriety, be distinguished into parts preparatory to the impression of sound, and parts more immediately subservient. Under the first class may be ranked every part except the labyrinth, as the meatus auditorius, membrana tympani, the cavity of the tympanum, with its apertures and contents. Under the last class may be considered the labyrinth and its contents.

"In the present case, the first of these classes appeared very perfect: the meatus auditorius conveyed the tremulous motions of the air to the membrana tympani, which again, by the communication of the malleus, incus, os orbiculare, and the stapes, conveyed these movements to the labyrinth.

"The Eustachian tube being pervious throughout its length, performed its office, viz. that of preserving the balance between the air on the outside of the membrana tympani, and that in the cavity of the tympanum, by which means that membrane is allowed to vibrate in a more perfect manner.

"It is not altogether certain that an obstructed Eustachian tube will produce total deafness, though it may diminish that sense in a very high degree, in proportion as the freedom of vibration of the membrana tympani is impeded.

"But if it could be clearly proved that a total deafness arose from this cause; and if it were likewise possible to ascertain this in a living subject; there is a probability of obtaining relief from an operation. The most natural idea in such a case would be to restore the natural opening by the introduction of instruments up the nose. But the distant situation of the orifice of this tube from the entrance of the nostril, together with its being out of sight, create a difficulty; and it is probable that our attempts in this way might be in vain. There remains, however, another expedient. It is well known that the mastoid process of the temporal bone is internally composed of large cells, which have an opening of communication with the cavity of the tympanum in a manner similar to that of the Eustachian tube: in such a case a perforation might be made into that process, and the communication between the external and internal air be again restored.

"In recording the appearances on dissection," continues Mr. Haighton, "the diminished size of the auditory nerve was noticed. Is this to be considered as a cause of deafness, or as an effect? I should imagine the latter. For if it were the cause, we should naturally expect the effect to be in proportion; and instead of a total deafness, there should have been only a partial one. It is most probable that its connection, in this case, is only an effect; for it is a law in the animal economy that parts increase in bulk from moderate use, and become diminished from the want of it. This is very evident in the muscles, where, from a dis-

eaſed joint which prevents motion, the whole limb is obſerved to ſhrink.

“ I have known the ſame thing take place in the optic nerve, where there had been an accidental blindneſs. I ſhould therefore conſider this as the *effect*, and not the *cauſe*.”

In tracing the phenomena of the ſenſe of hearing, it is of ſome importance to notice the diſcovery made by Mr. Aſtley Cooper, of London, that the imperfect ſtate, or even the total deſtruction, of the *membrana tympani* does not produce deafneſs, nor even materially derange the natural functions of the ear. For information on this ſubject, however, we refer the reader to Mr. Cooper’s papers in the *Philophical Tranſactions*.

SECT. II. *Of the TOPICAL REMEDIES to be employed in Diſeaſes of the EAR.*

We have already ſhewn that the functions of the ear may be injured by wounds, ulcers, or any thing that hurts its fabric. The hearing may likewiſe be hurt by exceſſive noiſe; violent colds in the head; fevers, hard wax, or other ſubſtances ſticking in the cavity of the ear; too great a degree of moiſture or dryneſs of the ear.

When deafneſs proceeds from cold applied to the head, the patient muſt be careful to keep his head warm, eſpecially in the night; he ſhould likewiſe take ſome gentle purges, and keep his feet warm, and bathe them frequently in lukewarm water at bed-time. When deafneſs is the effect of a fever, it generally goes off after the patient recovers. If it proceed from dry wax ſticking in the ears, it may be ſoftened by dropping the following ſolution into them:

(No. 86.) ℞ Natri muriat. ʒj.

Aquæ fontis ʒj. Miſce.

In a day or two afterwards the ear muſt be ſyringed with warm water.

If deafneſs proceed from dryneſs of the ears, which may be known by looking into them,

(No. 87.) ℞ Linim. ſaponis ʒj.

Aquæ diſtillat. ʒiij. Miſce.

A few drops of this may be put into the ears every night at bed-time, ſtopping them afterwards with a little wool or cotton. Some, inſtead of oil, put a ſmall ſlice of the fat of bacon into each ear, which is ſaid to answer the purpoſe very well.

When the ears run much, or abound with moiſture, beſides an iſſue or ſeton, which ſhould be made as near the affected parts as poſſible, the ears ſhould be thoroughly waſhed every day with a large camels-hair pencil dipped into warm water.

Some recommend the gall of an eel mixed with ſpirit of wine, to be dropped into the ear; others, equal parts Hungary-water and ſpirit of lavender. Etmuller extols amber and muſk; and Brookes

says, he has often known hardness of hearing cured by putting a grain or two of musk into the ear with cotton-wool. Where, however, an application with considerable stimulant power is necessary, camphorated oil, with the addition of a few drops of volatile alkaline spirit, may be considered as one of the best. It is proper, however, to begin with a small quantity of the alkali, increasing it as the ear is found to bear it. The following formula is used at St. Thomas's hospital, under the name of *Guttæ acousticæ* :
(No. 88.) ℞ Ol. Amygdal. ʒiij.

Aq. ammon. ʒj. Misce.

In some instances, where deafness depend on a state of insensibility in the nerves, electricity, particularly under the form either of sparks or of the electric aura, has been employed with great success. But these and other applications must be varied according to the cause of the disorder, which however is always difficult, and often impossible, to ascertain.

Mr. Maule for these purposes recommends a mixture of oil of almonds and spirit of turpentine, in such proportions as may just afford an adequate stimulus to the part.

SECT. III. *Of the MECHANICAL MEANS by which the hearing may be assisted in Cases of DEAFNESS.*

WE have hinted above at the methods usually practised by deaf persons to assist their hearing, and these are too well known to require a particular description. The following remarks, however, of Prof. Arneman, on Acoustic tubes, being both new and important in a practical view, we have thought their introduction here indispensably necessary.

The beneficial use of acoustic tubes, or *hearing trumpets* as they are popularly called, depends on two points; 1. That the sound is put into a stronger vibrating motion through the medium of the metal, and at the same time; 2. That a resonance, and new reflection of the sound, is produced.

The sound increases and becomes stronger by these instruments, but if they are not properly constructed, it is likewise made less distinguishable. The best acoustic tubes are the most simple ones, either quite straight, or with a little curvity. It is also essential, they should have a wide opening to receive a greater portion of sound, and by which it is brought at the same time more condensed to the organ of hearing. Those that are much curved, have no great effect, and likewise the inconvenience that on account of their curved line they cannot be worked so even by the artist. The same may be said of the conoidical tubes, in which the sound ceases to be reflected at the place where the angle grows greater than a right one, and becomes retrograde; because, according to Mr. Lambert's Observations on Acoustic Instruments (a German work), the angles of reflection increase like unequal numbers; and the last which can be

admitted, must not exceed 90° . The form of an entire cone, is therefore by no means calculated for propagating the sound, which, having entered, goes out again, without reaching the top of the cone. The parabolic form is the fittest for the construction of acoustic tubes, into which the sound enters in a direction parallel with the axis, and is by reflection concentrated as it were in a focus. Acoustic instruments with an hemisphere to them, are inferior to these, because the sound is only reflected from the centre, and at the same time not so easily intercepted.

However, it seems that the construction of these instruments has not been brought to so great a perfection, as not to admit some improvements founded upon practice and experience. For the purpose of promoting this, Mr. Arneman intends to give, by degrees, figures and descriptions of those that have proved most useful by experience, and he invites all practitioners in Germany, who have had an opportunity of making observations to this subject, to communicate any instrument of the kind they have applied with success, by which means much would be contributed to a more perfect and sure method of diminishing those inconveniences arising from difficult hearing, for which so many seek advice and relief in vain, against an evil, which makes men unfit for enjoying life from the most interesting mean, that of communicating and receiving ideas by word of mouth. The public would be much benefited if the practitioners of this country would impart their experience on the subject, and contribute to such an useful and humane undertaking.

The inventor of the instrument represented in Plate V. is not known, but it belongs certainly to the best of the kind that has been contrived. It is made of thin brass or copper, and should not weigh more than eight ounces, whereby it becomes very portable, and may as well serve for the right as for the left ear. To enable any artist to make this instrument accurately, it has been thought proper to add the dimensions of the different parts of which it is composed. H G I F is the cup, of which H I has 3 Paris inches 6 lines in diameter. F G = 2 Paris inches 10 lines. H F is = 3 Paris inches 1 line. F G is the bottom of the cup, which must particularly be made with exactness, because the use of the instrument depends in a great measure on its construction. It may be made as the segment of a circle whose radius is = 2 inches 7 lines Paris; but it is still better to give a parabolic form to the segment, whose focus is 1 inch Paris. For this purpose it is necessary to work after a certain model or standard, of which fig. 2 gives an idea, after which the bottom must be accurately made. The inside ought to be smooth and well polished, the whole afterwards soldered on, when the instrument is put together. The others are, that which receives the sound, D E, and the conducting tube, which carries it to the ear, K L B. The former is to be performed in the same parabolic form as the bottom of the cup, and must therefore be exactly worked after the above fig. 2, except that its chord

is by 4 or 5 Paris inches smaller than the bottom. In the middle of this part, DE, a hole is made, whose diameter is 1 Paris inch $2\frac{1}{2}$ lines, which is at the same time the lower diameter of the tube KL, its upper diameter in A being only 6 lines. The length of the tube from KL to A, is 5 inches 10 lines. This must now be bent in such a manner, that KL and A make an angle of 90° . Being well polished inside, the part DE is soldered into it, and the whole conducting tube fastened to the cup in IL, so that DE is equally distant from all sides of the cup in an exact horizontal direction, and the focus of the part DE likewise sufficiently distant from the focus of the bottom. In A another piece of tube is put on, of 9 inches in length, and fastened to it by means of a ring on the former A, at the distance of 1 inch from its end, with an opening in its periphery, through which a hook may pass, and turning this afterwards, the tube becomes one contiguous piece. On the curvation in B, a top of bone, ivory, or horn is put, to prevent the ear being irritated and inflamed, which may otherwise be caused by the metal. The last part is the cover, HI, perforated with holes, of which fig. 3 shews the profile. The part AB being taken off, the instrument may be conveniently carried in the pocket. It can also be fastened to the body by ribbands, by means of two clinchers in MN, and thus even used in going a-shooting, &c.

Prof. Arneman proceeds to examine the different instruments that have been proposed as hearing-trumpets. The instrument, fig. 3, has been much recommended, though it appears from its construction to be far inferior to that we have already described. It consists of a hemisphere made of brass, ABC, fig. 1, whose radius is $= 23''$ Paris lines, and its diameter consequently at AC $= 2 + 23'' = 3''$ inches $10''$ lines. On it is fastened the cover, which is convex, and perforated with many holes. At CK is an opening $11''$ in diameter, into which goes a conical conducting tube, $16''$ long, the diameter of which has, at GZ, $= 10''$, and its opening at OP, $= 4''$. For greater convenience, the tube may be taken in pieces, as appears at NMC. At OP, or that part of the conducting tube which is applied to the ear, it ends in a top, which is generally made of tin, for the purpose of shutting the meatus auditorius; but as experience has shewn, that the continual touching of a metal generally hurts the ear, it would be advisable to have the top made of ivory, bone, or horn. The conducting tube penetrates into the middle of the hemisphere, where it is cut off in an oblique direction FG, to which is soldered a conical receptacle, the bottom of which is oval, as is seen in fig. 1, HJK. This receptacle is intended for intercepting the sound, when it is reflected from the interior surface of the hemisphere; but as it seems to be placed in a wrong position, it is more calculated to confound the sound, than to conduct it properly. In order to convince the reader of what we have here stated, and to shew, that from the construction of that instrument it is impossible it should answer its purpose, fig. 2 is added, to demonstrate how

the reflection of the sound proceeds: it represents the same acoustic tube, likewise how the rays of sound fall in, and how they are again reflected; these are figured in ABCDEF. It ought here to be first considered, that the point of concentration of the rays of light, as well as of sound, fall into the middle of the radius of the inner superficies of a globe, which is in this figure at O. This, however, is only the case with rays that fall in near the axis; the rest are not so far propagated, declining the more and more from that point, by which means a confusion and want of distinction is produced. Hence it appears, that the conical receptacle HIK, intended for the interception of the sound, has not the proper form, but that the rays, before they reach it, diverge, and that the ear, for being able to understand every thing clearly and accurately, ought to be placed at O. The hemispherical form is likewise of no utility; and by examining the reflection of some rays, it will be shewn, that it is not proper to convey the sound clear and accurate. The ray *f* for instance, is reflected in the same direction as it comes in. A, a ray more distant from the centre, is reflected at *a*, and consequently does not reach that point where it could be conducted by the intercepting receptacle: the same may be said of B*b*, which being rebounded against the opposite side, passes out in the same direction it fell in. From this it will be understood that all rays from A to B are of no use at all, but rather confound the sound; and those that fall in from B to C spring back in the same direction they came in, without affecting the ear at all. The ray C is therefore the first that touches the receptacle, and gets into the conducting tube, though it is likely to be dispersed by being reflected with very acute angles, as is seen in fig. 2, at *ccc*. The ray D rebounds also against the tube, but is reflected with larger angles, increasing by degrees; whence it appears, that the conducting tube must always be of a determined length, if the sound is to be perceived by the ear. The line *ddd*, shews the reflection of this ray: the direction in which the ray E is reflected, is seen in *ee*. This may suffice to shew, that only a small part of the rays of sound, which fall in between C and D, are properly conducted and perceived by the ear, the rest becoming quite useless. This instrument seems, therefore, not to be properly calculated to convey the sound clearly and distinctly to the organ of hearing; a statement which experience has likewise confirmed, as it was used by several people without the expected success.

CHAP. XVIII. OF THE WRY NECK.

WRY NECK may be owing to different causes; as contraction of the skin in consequence of burns, or other kinds of sores; relaxation of the muscles on one side of the neck, particularly the mastoid, while those of the other side continue to act with vigour; preternatural contraction of the muscles of one side of the neck, the others

having their usual power; or, a bend in the vertebræ of the neck.

When the disease is owing to a contraction of the skin, this is to be divided through the whole of the contracted part, guarding against cutting the external jugular vein. When the contraction of the mastoid muscle is the cause of the disease, the muscle should be divided by gentle strokes, so as to run no risk of wounding the great vessels situated under it. When an incision is made either with a view to divide the muscle or the skin, the head is afterwards, by means of a machine (fig. 52), to be kept in a proper posture during the cure until new granulations form and fill up the empty space. When the disease is merely owing to a curve of the bones of the neck, the same kind of machinery may be useful with that recommended for cure in the other parts of the spine. But sometimes the disease arises from an affection of the bones of a more serious nature. Here the disease in the vertebræ commonly begins with a slight pain, which gradually becomes worse, and the head is turned over to the sound side. As the disease becomes worse, a fulness can be observed very painful to the touch; and moving the head becomes so distressing as to be almost impracticable. The only method which has been found to be effectual in this case, is the insertion of a pea-issue on each side of the tumor, and retaining it till the pain and stiffness are entirely removed.

CHAP. XIX. OF BRONCHOTOMY AND CESOPHAGOTOMY.

I. THE operation of BRONCHOTOMY is an incision made in the trachea, to make way for air into the lungs, when respiration is obstructed to such a degree that life is in danger. If the patient's breathing be already stopped, the operation ought to be done with the greatest expedition: using any instrument which will most readily make an opening in the trachea, as the delay of a few moments will often put a period to the person's existence. Experience has shewn, indeed, that in by much the greater number of cases, by a total stoppage of respiration for only five or six minutes, life is irrecoverably destroyed.

In performing the operation, where, from the nature of the case, sufficient time is allowed, the patient is to be laid on his back upon a table, and properly secured by assistants. A longitudinal incision is to be made, about an inch and an half long, through the skin and cellular substance, beginning at the under edge of the thyroid cartilage; the sterno-hyoid and thyroid muscles are then to be separated; the thyroid gland is to be avoided as much as possible, on account of its vascularity. As soon as the trachea is laid bare, the bleeding vessels, to prevent coughing, are to be secured; then, with a common lancet, a puncture is to be made as high as may seem practicable between two rings of the trachea, of such a size as to

admit the introduction of a double canula (fig. 53), large enough to allow the patient to breathe freely, and of such a length as neither to be in danger of slipping out, nor of irritating the back part of the trachea. Such a canula has long been recommended by Doctor Monro in his *Course of Surgery*. Previous to its introduction the canula may be put through several folds of linen compress, or these may be first slit half way down and applied, so that any of them may be removed and replaced at pleasure. This double canula is to be fixed by a strap round the neck; and when mucus obstructs the passage of the instrument, the inner tube can be withdrawn, cleared, and readily replaced; while the patient is, during this time, breathing through the outer one, and by means of a screw the tubes can be regulated according to the motions of the trachea. After the canula is fixed, it ought to be covered with a piece of muslin or crape, to prevent the admission of dust, insects, &c. As soon as the causes inducing suffocation are removed, the canula is to be withdrawn, and the skin immediately brought over the orifice, and retained there by a slip of adhesive plaster.

2. By *CÆSOPHAGOTOMY* is understood the cutting open the œsophagus, to allow substances sticking in it, and which cannot be extracted otherwise, to be removed. It is only to be done, however, in cases of the most extreme danger, as it is attended with much hazard; and there are only two instances yet on record of its having been performed with success, though there are several instances of wounds in the œsophagus being healed. The operation may be rendered necessary, where obstructions of the œsophagus become so complete as to prevent the passage of nourishment into the stomach, or of air into the lungs. But it is evident, that when the obstructing cause is in the lower end of the œsophagus, any incision becomes useless.

In performing the operation, the patient is to be secured in the same manner as for bronchotomy, and an incision made through the skin and cellular substance as directly opposite as possible to the part obstructed. If it be done with a view to remove an obstruction, the muscles over the trachea are to be pulled to one side, and the trachea to the other, by means of a blunt hook; by which the œsophagus will be brought into view. If the obstructed part now come in sight, the incision is to be made directly upon the obstructing body, which is to be extracted by a pair of small forceps; but if the obstruction happen to be further down than we can with safety have access to the œsophagus, the incision is to be enlarged as much as possible, that the forceps may be able to reach and extract it. When the operation is performed, the wound will be difficult to heal, as the sides of it will be frequently separated by the action of deglutition. On this account as great a degree of abstinence as possible is to be advised; and nothing but nourishing liquids, in small quantities, are to be allowed. The patient should

be prevented from moving his neck ; and the wound is to be healed as soon as possible by the same methods which are used with wounds in other parts of the body. On the other hand, if the operation has been done for the purpose of conveying nourishment into the stomach when the patient was distressed by a tumor either in the œsophagus itself or in some of the neighbouring parts, it will be necessary to keep the wound open during the continuance of the tumor, or the life of the patient.

CHAP. XX. OF SORE NIPPLES.

WOMEN are more generally affected with sore nipples in suckling their first child than at any period afterwards. This may, in some measure be owing to the smallness of the nipples ; but very often it arises from their being unaccustomed to the irritation of sucking. In some cases, the nipples are so flat, and so much sunk in the breast, as to render it difficult for the child to lay hold of them. Here assistance can sometimes be given, by the mother pressing back the prominent part of the breast, so as to make the nipple project between two of her fingers. Should this be insufficient, the nipple may be made to project by applying to it a stout child several months old : but when this cannot be done, breast-glasses may answer the same purpose. By applying these to the nipple, and sucking out the air, the child will commonly be enabled to lay hold of it.

The nipples at this time are liable to *excoriations*, cracks, or chops ; which, though not attended with a formidable appearance, are frequently more distressing than large ulcers. Astringent applications are most to be depended upon in such complaints ; particularly a solution of vitriolated iron in water. Sometimes port wine, brandy properly diluted, or lime-water, are of service ; all of which ought to be applied warm. After bathing the parts with any of these, the nipple should be covered with spermaceti ointment ; but the first remedy is considered best. Even a little soft pomatum frequently rubbed upon the part, and covered with a soft linen rag, is sometimes found to give considerable relief. But the nipple should be perfectly cleared of these applications before the child is laid to the breast ; and this may be done with a little port wine, or equal parts of brandy and vinegar. If proper attention be paid to these remedies, they will commonly be found to have the desired effect ; but if the contrary should happen, another remains to be mentioned, which, in different instances, has given great relief : it consists in the application of a thin skin to the nipple, as the neck and part of the body of a swine's bladder with an aperture in it ; which being properly moistened and fixed to the breast, will completely protect it in the time of sucking. Some indeed have em-

ployed a small teat taken from a cow, annexing to the thick end a hollow grating of silver, which receives the nipple. This is drawn by the mouth of the child very effectually, the teat, when not in use, being kept in gin to prevent its putrifying. As long as the nipples remain any way affected, small cups of glass or tin are useful for retaining the dressings, defending the nipples from the friction of the clothes, and receiving any milk which may fall from the breast.

For some further remarks on this complaint, see our subsequent volume on MIDWIFERY.

CHAP. XXI. OF PARACENTESIS OF THE THORAX.

WHEN either the action of the heart or of the lungs is impeded by fluids collected in the cavity of the pleura, a discharge of these fluids by a perforation is the only chance the patient has for relief. The fluids which collect in the pleura are, serum, blood, air, or pus. A collection of water or serum is frequently found in the thorax, combined with dropsy in other parts of the body; but the affection is often local, and it is then chiefly that advantage is to be derived from an operation. Besides the two great cavities of the thorax, collections of water are frequently met with in the pericardium, and are said to be sometimes discovered between the layers of the anterior mediastinum.

Symptoms.] The disease is marked by the following symptoms: there is a sense of weight or oppression in the thorax, and difficulty of breathing; the patient has frequently a more uneasy sensation in one side than in the other; has sudden startings during sleep with a sense of suffocation; is troubled with a frequent dry cough; the pulse is small and irregular; the skin dry, and the urine scanty.

With these symptoms there are commonly other marks of dropsy; and the patient sometimes, upon any sudden motion, is sensible of an undulation within the chest: and when the quantity of water is considerable, the undulation will even be heard by the bystanders, if the body be smartly agitated. For this purpose, the patient's body should be uncovered while under examination; and the surgeon should place his hand upon the breast near the sternum; then an assistant ought to raise the patient suddenly from an horizontal to an erect posture, or to stand behind the patient and make sudden jerks; when, if water be present, the undulation will be felt; but it is necessary to guard against being deceived by the noise sometimes made by the contents of the stomach.

When the water is collected on one side only, if the disease be of long standing, for the most part that side is more prominent than the other. If the water be in the pericardium, the symptoms are nearly the same as those above enumerated, with this difference, that the pain is generally felt behind, and to the left side of the sternum;

and the stroke of the heart is as if buried in water, while an undulatory motion has been said to be felt opposite to the anterior extremities of the third, fourth, and fifth ribs.

Treatment.] In the treatment of this disease, little advantage can be derived from internal remedies. Squills, cream of tartar, mercury, and digitalis, are on some occasions attended with advantage; but the only method from which we can expect any degree of success, is the removing of the water by an operation, which should be performed as soon as there is reason to expect that danger may arise from delaying it longer. The operation is done in the same way as shall be afterwards described in the case of empyema.

Blood in the thorax.—Blood collected in the chest is always extravasated through some wound or rupture of the vessels of the lungs or thorax. The breathing becomes oppressed, the motion of the heart and arteries feeble and irregular, and all these symptoms are more distressing than collections of other fluids. As it frequently happens, in cases of this kind, that some of the vessels of the lungs are injured, part of the blood is thrown up by coughing; which, when considerable, gives a temporary relief to the lungs and heart; and while this is the case, no operation is necessary; but whenever the action of these parts becomes much impeded by a great accumulation of blood, a perforation ought to be made to discharge it. When the extravasated blood is too firmly coagulated to pass off by a perforation, the wound ought to be made considerably larger; and if this be insufficient, injections of warm water ought to be thrown in, and allowed to remain for some time, to promote the dissolution of the mass, which is afterwards to be evacuated. If the extravasation has been occasioned by a wound in the lower part of the thorax, a new perforation will be unnecessary; an enlargement of the wound will be quite sufficient. But if it be situated in the upper part of the cavity, a perforation in the middle and lateral part of the thorax ought to be made, that the blood may be freely discharged. In case of a rib being fractured, or a vessel ruptured, the incision ought to be made as near as possible to the part affected, to allow the blood to escape, and loose pieces of bone to be removed.

Air in the thorax.—The discharge of air into the cavity of the thorax produces symptoms little less alarming than those proceeding from the effusion of blood. In general they are, oppression in breathing; a tightness of the breast, attended with pain; inability to breathe in the recumbent posture; a flushing and swelling of the face; a feeble, and at last an irregular, pulse; the extremities become cold, and cold sweats break out on the forehead. With these symptoms there is frequently a swelling over the external parts of the body, by air getting from the ruptured lungs into the common cellular substance; and all these complaints increasing, the patient, if not quickly relieved, soon dies; sometimes in a few hours, with marks of suffocation.

Air may be produced in the cavity of the thorax by wounds in the lungs, by mortification generating air in any of the thoracic viscera, by erosion of ulcers, by laceration in consequence of fracture in any of the bones of the thorax.

We distinguish this from other collections by the sudden oppression in breathing, by the flushing of the face, by no blood being thrown up, and by the emphysematous swelling of the chest and other parts, which gives a crackling noise upon being pressed.

The treatment of this complaint consists in making small punctures in the affected part of the skin, so as to allow the air to escape from the cellular substance: and if the air shall have spread to distant parts of the body, it will escape most readily by such openings. But if this give no relief to the oppressed breathing, paracentesis ought to be performed. In former times, patients labouring under such symptoms were almost constantly left to their fate. Within these few years, however, some cases have occurred where the patients have been completely relieved by an operation being performed. This is done in the same way as in the evacuation of other fluids.

Empyema.—Purulent matter is more frequently collected in the thorax than any other fluid: it is much more frequently formed, however, than confined there. As the matter is usually spit up as fast as it is generated, in the dissections of those who have died of this species of consumption, much extravasated pus is rarely found in the cavity of the thorax, though a great portion of the lungs be destroyed. Cases not unfrequently occur, however, which require the operation; and these may be distinguished by the following symptoms: the patient at first generally complains of a fixed pain in some part of the thorax, attended with heat, quick pulse, and other symptoms of inflammation; respiration becomes oppressed; he is unable to lie on the sound side; or, if both sides be affected, can only lie on his back; has a constant tickling cough, clammy sweats, frequent rigors or shiverings. If these symptoms be attended with an enlargement of the affected side, or with a soft œdematous fulness there, and, along with these, if there be a sensible undulation of a fluid, it may be concluded that a collection of matter is formed. The matter is commonly first formed in the substance of the lungs, and is afterwards discharged into the cavity of the pleura, though in many instances large quantities of purulent matter have been found to originate from an inflamed state of the pleura.

Method of operating.—The operation ought to be performed as soon as there is evidence of the collection being the cause of the oppressed breathing, and that there are no signs of this being relieved by expectoration. The operation ought to be done upon the part where the collection is supposed to be situated; and this may be known by the seat of the previous pain, and perhaps by the matter being distinguished between two of the ribs. If no matter flow, it is probably seated in the substance of the lungs; but even in this

case, such an opening may be useful, by taking off the support, and giving the abscess an opportunity of bursting. If the undulation of the fluid be general, the operation is to be performed in the following manner: the patient is to be laid in an horizontal posture, with the affected side inclining a little over a table. An incision is then to be made with a scalpel through the skin and cellular substance, between the sixth and seventh ribs, and half way between the spine and sternum, from one to two inches in length, and in the direction of the ribs. The muscles are then to be cut through, keeping as near as possible to the upper edge of the inferior rib to avoid wounding the intercostal vessels and nerves. As there is no occasion for the bottom of the wound being of the same length with the external incision, it may be gradually contracted, so as at last to be only about the half. The pleura being now exposed, is to be divided by slight scratches, taking the assistance of a furrowed probe to prevent the lungs from being injured, in case they shall be found adhering to the ribs. If the contrary takes place, the fluid will rush out immediately upon a small opening being made into the cavity of the thorax; but if an adhesion appear, and if it be slight, which may be known by the introduction of a blunt probe, as much of it may probably be separated as to allow the fluid to escape. In case it be considerable, the incision is either to be continued a little nearer to the sternum, or an attempt made in some other part. After the fluid is observed to flow, it will be proper to introduce a silver canula (fig. 55) at the opening; by which means it will run more readily off, or can be more easily stopped in case the patient become faint. If the quantity of fluid be not considerable, it may generally be drawn off at once; but if it be great, partial evacuations ought to be made at different intervals, as circumstances may direct.

The canula therefore should be so formed, that, by means of a strap put round the body of the patient, it can be readily secured. Its mouth is to be stopped by means of a cork. A pledget of emollient ointment is to be laid over the wound; and the whole being fixed by a napkin and scapulary bandage, the patient should be laid to rest. The remainder may be drawn off, probably in a day or two, or as soon as it is supposed the patient can bear it. After the fluid is carried off, the canula is to be withdrawn and the wound healed; or in case the operator be afraid of bad effects being produced upon the lungs by irritation from the canula, though of this this there will be little danger, as the lungs will generally be out of its reach, the skin may be so drawn back before the first incision is made as afterwards to serve the purpose of a valve. And for some days after the operation, the incision in the integuments may be brought opposite to that in the pleura, to allow the matter to run off, or to produce a radical cure by exciting a certain degree of inflammation over the lungs and inside of the thorax.

After the matter is evacuated, the wound ought to be kept open a considerable time, for the purpose of discharging the matter as fast as it is collected. If the wound be apt to heal up too soon, which will be known by the symptoms of oppression being renewed, it will be proper to keep the passage open by tents, or to introduce a bougie or silver canula a few hours occasionally, till the source of the matter be dried up; which, however, seldom happens for a considerable time, and frequently never. By attending to this circumstance, the patient may enjoy good health; whereas, by the neglect of it, a repetition of the first operation would soon be necessary.

CHAP. XXII. OF PARACENTESIS OF THE ABDOMEN.

THIS operation is an opening made into the abdomen, in order to empty any quantity of extravasated water collected in that species of dropsy called the *ascites*.

Symptoms.] A fluid in the cavity of the abdomen is discovered by the swelling which it produces; by a sense of tightness in the part affected; by laborious and difficult breathing, especially when in the horizontal posture; but particularly by a sense of fluctuation being communicated to the fingers placed on one side of the abdomen, while the swelling is forcibly struck on the opposite side. There is besides much thirst, a dry skin, scantiness of urine, &c. Whatever may be the influence of diuretics and other evacuations in the cure of general dropsical affections, they are rarely serviceable in local diseases of this kind, and even the operation of tapping seldom cures the disease; but it commonly gives the patient ease for the present and is attended with very little pain.

Operation of the paracentesis.—Upon the supposition that nothing forbids the extraction of the water, the manner of operating is this: having placed the patient in an horizontal situation, as best suited to prevent fainting, and to allow the water to run freely off, the part to be perforated ought to be marked with ink; and the most approved part for the operation seems to be at a point lying at nearly an equal distance between the umbilicus and the centre of the spine of the os ilium, this being most out of the way of any of the viscera, and sufficiently depending to allow the water to escape; and as the spleen is less frequently enlarged than the liver, the left side is generally preferred. Various means have been used for applying an equal pressure in this operation. Some apply pressure by the hands of assistants; others use a broad piece of flannel, or other kinds of cloth, slit a certain way from each end; then the ends are drawn by assistants till sufficient pressure is made. Broad belts are used by some practitioners; but one of the best contrivances for this purpose is the bandage invented by the late Dr. Monro. Till of

late years, a puncture was first made with a lancet, then a trocar of the common round form with a triangular point was constantly used; but the entrance of this instrument being always attended with difficulty and pain, a flat trocar is now employed; and that invented by Mr. Andrie (Plate II. fig. 56) seems the best which has yet appeared. The bandage being now applied and drawn a little tight, the part to be punctured is to project a little over the edge of the bed. The operator fixes the head of the trocar in the palm, while the fore-finger directs the point of the instrument. He is then to push it forwards till he is satisfied, by the want of resistance, that the end of the canula has reached the cavity of the abdomen. The perforator is now to be withdrawn, and the water allowed to flow as long as any of it can be taken off, the bandage being from time to time pulled to favour the discharge. But if the patient become faint, a stop for a few minutes should be put to the discharge every now and then, by placing the point of the finger upon the mouth of the canula. If any of the viscera happen to stop the flow of the water before the swelling is much diminished, a blunt probe is to be introduced, but bent at the end, lest it slip into the cavity of the abdomen. When the serum is thick and gelatinous, it may sometimes be necessary to introduce a larger trocar than the one first employed. When the water does not flow, because it is collected into cysts, the canula is to be withdrawn, and the wound covered with a pledget of simple ointment. The operation may then be renewed immediately, or on the following day, upon the opposite side of the abdomen, or in the most depending part of the tumor, in whatever part of the abdomen it may be placed.

During the operation it is necessary to keep up a pressure on the abdomen, otherwise the patient will be apt to fall into faintings from the weight on the great vessels of the abdomen being taken off, and the sinking of the diaphragm succeeding, in consequence of which more blood flows into the inferior vessels than usual, the superior ones are left too empty, and thus the regular progress of the circulation is interrupted. To obviate this, the pressure must not only be made during the operation, but be afterwards continued. As to the dressing, it has been already mentioned, that the wound may be covered with a pledget of simple ointment; but between the skin and the roller some recommend a piece of flannel dipped in brandy or spirit of wine to be applied. The bandaging in this manner may even have some effect in preventing a return of the disorder. When the water again collects, the operation should be repeated whenever the swelling has acquired a considerable size: and though this operation does not always effect an absolute cure, yet it sometimes preserves life a great many years, and even a comfortable one, especially if the waters have been long collected.

After the operation, practitioners advise the abdomen to be frequently rubbed with astringent spirituous applications. This can-

not be done for the first two days after the operation, as it would then be improper to remove the bandages; but after that time, they may be removed daily, for about a quarter of an hour; and camphorated spirit of wine, or other applications which may have a similar effect, may be applied with strong friction over the abdomen, the body being kept, during this period, in the horizontal situation, and the bandage applied immediately after the friction is finished.

Tympanites.—Sometimes, instead of water, we find air contained in the abdomen; and the inflation is of two kinds: first, that in which the air is contained in the intestines; in which case the patient has frequent explosions of wind, with a swelling of the belly frequently unequal. Secondly, where the air is collected in the cavity of the abdomen; and here the swelling is more equal, without any considerable emission of air. In both varieties of the disease the swelling is more tense than where water is contained, and the belly sounds when struck, and affords to the touch and pressure nearly the same sensation as it received from a bladder filled with air. Of these two disorders the former is by much the most common. Many extensive practitioners have never met with an instance of true abdominal tympanites. A few well-authenticated cases, however, have occurred, where the air was collected between the containing and contained parts of the abdomen. In some of them the air was found to have escaped by a small hole in the intestines, from which it has been supposed that the other cases were of the same nature. When the symptoms become urgent, there is as much necessity for discharging the air as for drawing off the water in cases of dropsy. The pressure and perforation are to be made in the same manner as directed for ascites, with this difference only, that a trocar of the very smallest size ought to be used; for by it the air can be as easily discharged, and the wound will heal more readily than when a large opening is made. After the air has been extracted, the treatment ought to be nearly the same as that recommended in cases of ascites.

We cannot conclude the present chapter, without calling the reader's attention to a paper on the *Paracentesis of the Abdomen*, published by Dr. James Sims, in the *Memoirs of the Medical Society of London*.

"The objections to the common mode of performing the paracentesis," says the doctor, "are numerous. A worse perforating instrument than the trochar can scarcely be contrived; for which reason considerable force is obliged to be used in driving it through the integuments, which being usually done by a stroke, it goes with a jerk into the cavity. In this mode no one can be certain how far it will penetrate; and I have known it, even in skilful hands, penetrate into the substance of the spleen and other viscera. To avoid this danger, I remember a celebrated anatomist recommending the

perforation to be made, prior to the use of the trochar, with a lancet through the skin, which gives the principal resistance, thus preferring a complicated but safer operation, to a more simple but dangerous one.

“ The use of the canula afterwards is perhaps not less objectionable; by its means more water is drawn off than the contraction of the integuments can compensate; therefore formerly many persons died under the operation. As this event was supposed, not unjustly, to take place from the sudden removal of the pressure upon the adjacent vessels, it has been proposed, and almost universally adopted, to make a pressure on the abdomen, by the hand, or by means of rollers, bandages, or laced waistcoats. How dissimilar such pressure to the natural, and how deficient in equality and uniformity! It is true it abated the danger of instantaneous syncope and death; but that it took away the more slow effects of the inanition may be doubted. What adds to the danger also is the common preference given to a large canula, on account of its being less liable to obstruction. Whenever the canula is obstructed, which mostly happens from the application of the intestines to its orifice, a probe is introduced for their removal, without any thought of the probable, though remote consequences, of the application, and it may be said irritation of such unusual extraneous matter to their peritoneal coat. And even where no probe has been introduced, the point of the canula must come in contact with that surface, when the water is nearly evacuated. About the same time likewise cold air is perhaps mostly admitted into the cavity, which is thought by many to be a very pernicious application.

“ The place where the operation is performed, which is halfway between the umbilicus and the upper anterior spinal process of the ileum, is not unexceptionable, the thickness of the integuments preventing an accurate perception of any enlarged or adhering viscus underneath. But the course of the epigastric artery is still a greater objection. It may be made a question whether there be not so great a variety in its course in healthy bodies as to prevent even a good anatomist from being able to point out its exact situation in any one body before dissection: but, admitting that he could do so in a healthy body, the case is different in the ascites, where from distension the situation of parts is so much altered as not improbably to bring the artery to very nearly the place where the operation is directed to be performed. That this is sometimes the case I know from having lost a very dear relation by that artery having been wounded by the trochar, and from my knowing some other similar events, I have reason to think that misfortune not unfrequent, even in very skillful hands.

“ From which of the former causes the almost constant bad success of the operation is derived I shall not pretend to determine; but have found, that in vastly the majority of cases a fever arises

after a few days, with those symptoms which may be supposed to point out peritoneal inflammation, and which cuts off the patient about, or soon after, the end of the second week. Were the proportion of the deaths to be accurately stated, it may be doubted whether any practitioner would choose to perform the operation, and also whether more would not recover if left entirely to themselves. The common people at least are so convinced of this, that it is with great difficulty they are brought to submit to it. But unfortunately in medical records the few successful cases are detailed at full length, whilst all the others are consigned to total oblivion.

“ Alarmed at the frequent miscarriages of the operation which I beheld, and greatly shocked at the loss of the relation I have just mentioned, I ventured, upwards of twenty years ago, when practising in the country, to recommend an entire change in the operation, by using the lancet alone at the umbilicus.

“ The first hint to this practice I took from a case of Ascites, which luckily occurred whilst the grief for the before-mentioned fatal hæmorrhage was yet strong on my mind. In this case the old cicatrix at the umbilicus opened, and, permitting a free passage to the water from within, on the least effort to cough the fluctuation was felt under the skin, which being slightly punctured with a lancet, the whole water collected in the abdomen was evacuated. Upon considering this case maturely, I resolved to carry the practice one step further, and to have the puncture made through the peritonæum in the next cases that might occur, should there be no similar opening at the spot; and, of seven cases wherein this advice was then followed, four recovered perfect health.

“ On my first coming to this city I proposed the method to several practitioners, but without effect; and I did not find myself so well established in the public confidence as to authorise my insisting on the operation. I have lately, however, had it performed in three cases, by Mr. Norris, an ingenious surgeon of this place. In the first it proved completely successful. The second was as bad a case as I ever saw: a very small delicate lady, who had above forty quarts of water in her abdomen; the integuments were grown so thin as to threaten bursting; she had not been out of bed for many months; her pulse was extremely quick, and scarcely to be felt; and her stomach would not retain any aliment.—It is needless to say that this case terminated fatally. The third was the case of a woman who had been repeatedly tapped before, and has been also several times since.

“ The operation which I allude to is very simple, being nothing more than thrusting in a common lancet at the umbilicus, until the water issues. The orifice should not be large, nor should the water be forcibly pressed out, but allowed to come away just as the contrac-

tion of the integuments occasions. Some water even mostly remains in the abdomen; but this is afterwards absorbed in those cases that terminate favourably. The evacuation is gentle, and continues a day or two, sometimes six or eight. The part where the orifice is made being tendinous, does not close while there is any pressing force exerted by the muscles; and there is scarcely a drop of blood lost.

“The pressure occasioned by the water upon the contents of the abdomen, and even in some measure of the thorax, is not suddenly taken off; so that there is no occasion for rollers, or a laced waistcoat. If we suppose with some, that the mere injury done to the membrane lining a cavity constitutes the danger, we may as readily suppose it to be avoided by this mode, as the part injured is only the cicatrix left after the falling off of the navel-string in the foetus, and therefore very different from any other part of the peritonæum.

“Having given this concise history of what I have seen of this operation, I submit it to the consideration of the medical faculty, hoping that it will appear not unworthy of a further trial. At the same time I must freely declare, that I know not one objection to this mode that does not more forcibly apply to the common one; whereas in elegance, simplicity, ease, freedom from hæmorrhage and pain, and in a number of other respects, it seems vastly preferable.

“It is to be noticed, that this operation is totally different from the perforation at the umbilicus recommended by some early writers, but since laid aside, in which a canula was used: the objections, therefore, to the latter, are not applicable to this operation.”

CHAP. XXIII. OF HERNIÆ.

SECT. I. *Of HERNIÆ in general.*

THE name of *hernia* might with propriety be applied to every swelling occasioned by the dislodgement of parts from those boundaries within which, in a state of health, they are contained; but the general acceptation of the term implies a tumor produced by the protrusion of some part or parts from the cavity of the abdomen.

Situation, &c.] The parts in which herniæ usually appear are the groin, scrotum, labia pudendi, the upper and fore part of the thigh, the umbilicus, and different points between the interstices of the abdominal muscles. If the situation of such tumors be various, the viscera which produce them are still more so; instances having occurred of the stomach, uterus, liver, spleen, and bladder, being found to form their contents. But a part of the intestinal canal, or a portion of the omentum, are from experience known to be the most frequent cause of their formation.

Distinctions.] From these circumstances of situation and con-

tents, all the different appellations are derived by which herniæ are distinguished. Thus they are termed *inguinal*, *scrotal*, *femoral*, *umbilical* and *ventral*; from their appearing in the groin, scrotum, thigh, navel, or belly. When the tumor is confined to the groin, the hernia is said to be incomplete, and is termed *bubonocoele*; but when the swelling reaches down to the bottom of the scrotum, the rupture is then supposed to be complete, and the disease obtains the name of *scrotal rupture*.

Of these disorders the inguinal hernia is by much the most frequent; next to that is the femoral. The umbilical is seldom observed in men, or even in women who have not borne children.

Causes.] The causes which tend to the production of hernia in its more usual form are these:

I. The containing parts of the abdomen we know to be elastic and compressible; whatever, therefore, tends to produce a diminution of capacity in the cavity of the abdomen, must occasion a proportional degree of risk of some of the contained parts being pushed from their natural situations. Violent coughing, crying, laughter, or great bodily exertion, are attended with more or less contraction of the abdominal muscles, and particularly of the diaphragm; and as the contraction of these muscles must always diminish the abdominal cavity, these causes therefore are frequently found to be productive of herniæ.

II. Falls, in consequence of the derangement they produce in the abdominal viscera, from the sudden and violent shock with which they are often attended, are not unfrequently the immediate causes of herniæ.

III. Persons of a preternatural laxity of frame are very liable to herniæ. The containing parts of the abdomen, from the want of a sufficient tone and firmness, are unable in such people to resist on all occasions the weight of the different viscera; and they are therefore more particularly exposed to disorders of this kind on the slightest application of any of the causes already mentioned.

IV. Sprains are apt to induce a laxity of the part injured; and have therefore a similar influence in inducing herniæ with general laxity.

V. It has been observed that the people of those countries where oil is much used as an article of diet are particularly liable to herniæ.

In whatever parts the parietes of the abdomen happen to be weakest, these various causes will most readily operate in producing herniæ; and accordingly we find, that descents of the bowels usually occur only in such parts.

In whatever situation a protrusion of any portion of the intestines occurs, except in the case of the hernia congenita, as all the viscera are contained within the peritonæum, a portion of that membrane it is evident must be carried down together with the parts pro-

truded; and in every such instance, it is this portion of the peritonæum which goes down along with the gut, that is termed the *hernial sac*. The size of this sac is various in different subjects, and in different stages of the same disorder. On the first appearance of the disease, it is commonly of no very considerable size, as such swellings seldom acquire any great bulk at once: but by repeated descents of the bowels, it comes to be pushed lower and lower, till in some instances its bulk becomes very considerable indeed; and when in this advanced period of the disorder the sac happens to be laid open, it is found to contain either large quantities of omentum or intestine, and frequently large portions of each. As the peritonæum has this property in common with many other parts of the body, of thickening according to the degree of any gradual extension applied to it, so in many instances the thickness and firmness of the hernial sac are really astonishing.

Cause of bad symptoms.] All the bad symptoms which are found to occur in herniæ, proceed, as may be readily supposed, either from obstruction to the passage of the fæces when the intestinal canal forms the tumor, or from a stoppage of circulation occasioned by stricture on the prolapsed parts: so that the attending symptoms, it is evident, will be always more or less hazardous, according to the nature of the parts so protruded.

Thus, when omentum alone forms the substance of hernial swellings, as that organ does not appear to be so immediately necessary for life as many of the other viscera, such tumors accordingly are not so frequently productive of bad consequences, at least they are seldom in any degree so hazardous as when a part of the alimentary canal is either protruded by itself or along with omentum.

Although this, however, is in general the case, yet it does sometimes happen, that even an omental rupture is productive of no small degree of danger. When a stricture so complete upon it occurs as to occasion a stoppage of circulation in the protruded part, mortification with all its bad consequences must be the certain event: and besides, the connection between the omentum, stomach, and other viscera, is such, that a sudden descent of any considerable portion of the former sometimes brings on vomiting, hickup, and other troublesome symptoms: and lastly, although a rupture containing omentum only might not of itself produce any thing bad; yet as the passage through which the omentum has slipped must of necessity continue open so long as that viscus remains protruded, and as that circumstance alone must, so long as it continues, render it more easy for a portion of gut likewise to get down, this of itself is a sufficient reason for entitling even this species of hernia to the serious attention of practitioners.

But whatever the contents of such swellings may be, as their remaining in some instances for a considerable length of time without being productive of any bad symptoms, must proceed entirely from

the circulation continuing to go freely on, notwithstanding the derangement of parts; so, whenever a stricture occurs on the protruded viscera, sufficient to produce either a stoppage of the circulation, or of the fæcal contents of the alimentary canal, when a portion of gut forms the disease, the following in general are the symptoms which accrue.

An elastic colourless swelling is observed at the part affected; a slight pain is felt not only in the swelling itself, but, if part of the alimentary canal is down, an universal uneasiness is perceived over the whole abdomen; and this pain is always rendered worse by coughing, sneezing, or any violent exertion. The patient complains of nausea; frequent retching; can get no discharge by stool; becomes hot and restless; and the pulse is commonly found quick and hard. When the swelling is formed entirely by a portion of gut, if no fæces be contained in it, it has a smooth, equal surface; and is easily compressible, but instantly returns to its former size on the pressure being removed: but in gut-ruptures of long standing, where hard fæces have collected in the protruded bowels, considerable inequalities are detected. When again the tumor is composed both of gut and omentum, its appearance is always unequal, it feels soft and somewhat like dough, and of course is not so elastic as when part of the intestinal tube only is down; for although, like the other, it is compressible, it does not so readily regain its former dimensions on the pressure being taken off.

It will be readily supposed, that the symptoms we have described never can happen from the presence of omentum *only*; for although stricture produced on a portion of omentum, even when no part of the intestinal tube is down, does now and then occasion a good deal of distress, such as pain in the part, sickness, vomiting, and twitching pains through the whole belly; yet no obstruction of the gut ever occurs from this, and of course none of the symptoms ever prove so alarming as when any part of a gut is affected.

Signs of mortification.] If the symptoms described as being produced by a strangulated gut, are not obviated by a removal of the stricture which produced them, the nausea and retching terminate in frequent vomitings, first of a bilious, and afterwards of a more fetid matter; the belly becomes tense; the pain turns more violent; a distressing convulsive hickup comes on; the fever, which before was not apparently of much consequence, now becomes very formidable; and a total want of rest, with a very disagreeable state of anxiety, continues through the whole course of the complaint.—These symptoms having gone on with violence for some time, the patient is at last commonly relieved on a sudden from all manner of pain; and then he flatters himself that all danger is over. But instead of that, the pulse, from having been hard and frequent, becomes languid and interrupted; cold sweat breaks out over the whole body, but especially on the extremities; the eyes acquire a

kind of languor; the tenderness of the abdomen subsides, and the swelling of the part affected disappears; the teguments covering the parts, which before were either of a natural appearance, or had somewhat of a reddish inflamed cast, now acquire a livid hue, and a windy crepitous feel is distinguishable all over the course of the swelling. If the protruded parts have not of themselves gone entirely up, their return is now in general easily effected by a small degree of pressure, and the patient then discharges freely by stool; but the cold sweats increasing, the hickup turns more violent, and death itself is at last ushered in by its usual forerunners, subultus tendinum, and other convulsive twitchings.

These are the ordinary symptoms of what is termed a *strangulated* or *incarcerated hernia*: that is, when the parts protruded become so affected by stricture as to produce pain; and do not either return to their natural situations on the patient's getting into a horizontal posture, or cannot even be immediately replaced by the hands of a practitioner.

Cure.] In whatever situation a strangulated hernia occurs, the only rational method of cure, it is evident, must consist in the removal of that stricture which prevents the return of the protruded parts. It is that stricture which ought to be considered as the cause of all the mischief; and unless it be removed, nothing effectual can be done for the relief of the patient.

Various methods have been attempted by practitioners for the removal of stricture in these disorders; all of which may be comprehended under two general heads.

I. Such as effect a reduction of the protruded parts, without the interposition of incision or any surgical operation properly so called; and,

II. A division of the parts producing the stricture, so as to admit of a replacement of the deranged viscera, constituting what is termed the *operation for the hernia*.

The remedies to be employed for accomplishing the first of these are, a proper posture of the patient, with the manual assistance of a practitioner; blood-letting, stimulating clysters, opiates, the warm bath, and proper applications to the tumor itself.—If these fail, there is then no other means of cure left but the operation of dividing the integuments, and replacing the viscera.

As soon as the assistance of a practitioner is desired for the removal of symptoms in cases of hernia, the first circumstance requiring his attention is the placing of his patient in such a posture as will most probably favour the return of the protruded parts. Placing the patient's feet over the shoulders of another person, while his body is allowed to hang downwards, and causing him to be a good deal jolted about, has on some occasions answered when other means have failed.

The surgeon should at the same time endeavour to assist the return

of the bowels, by means of gentle pressure with his hands and fingers. In the inguinal or scrotal hernia, this pressure should be made obliquely upwards and outwards to correspond with the opening in the external oblique muscle; in the femoral hernia it ought to be made directly upwards; in the umbilical and ventral hernia directly backwards.—The swelling should be grasped with one hand at the bottom, while with the fingers of the other hand an attempt is made to push gently the contents of the tumor into their place, always observing that the parts last protruded be first reduced. This operation is by authors termed the *taxis*.

When the means now mentioned have failed, no remedy affords more relief than blood-letting. The quantity to be drawn ought chiefly to be determined by the strength of the patient. There is scarcely any disease, however, where such large quantities of blood can with propriety be taken from weak people. Bleeding till the patient is in a state of deliquium animi, is frequently known to produce a more effectual relaxation of the muscles than can be done by any other means. On that account it is sometimes advised in cases of hernia, and the practice is now and then attended with advantage.

As an obstinate costiveness is commonly one of the most alarming symptoms of hernia, it has been a common practice to exhibit a variety of stimulating purgatives both by the mouth and anus; but they are very seldom of much service, and in that case almost universally do injury, by increasing not only the sickness at stomach, but the tension and pain of the tumor. When they are to be employed, they ought to be thrown up by the anus. For this purpose aloes and other stimulating substances, but particularly tobacco-smoke, are employed; and although this last remedy, which is to be thrown in by double bellows, &c. does not always act as a purgative, it may be usefully employed as an anodyne. Where an evacuation by stool is wanted, it may in general be readily procured by the injection of warm water, in which a little Castile soap is dissolved, in the proportion of a drachm or a drachm and a half of the latter to a pound of the former. Warm bathing is another remedy greatly extolled, either by general immersion or local application, by means of warm water put into ox-bladders covered with flannel, and laid across the abdomen.

To diminish the size of the tumor, remedies of an opposite quality from these have been used; and though by some this practice has been considered as hazardous, yet by others, particularly by the late Dr. Monro and Mr. Benjamin Bell, more advantage has been found from cooling applications than from those of a different nature. Snow, ice, or cloths dipped in a recent solution of sal ammoniac in water and vinegar, or cold saturnine applications, or cold water and vinegar, have been employed with advantage. If, notwithstanding these remedies, the disease becomes worse, and no probability remains

of success, the division of the parts producing the stricture can alone save the life of the patient.

To determine the *exact time at which to proceed to an operation*, has been considered as one of the nicest points in surgery. In general, when every attempt has failed, and no repetition of the former remedies is likely to succeed, the surgeon ought certainly to proceed to the operation. A few hours, even when assistance has been early applied, is perhaps all the time which ought ever to be consumed in trials of this nature. But however necessary this operation may be when a patient's life is in danger, as it is always attended with some degree of hazard, it ought never to be practised where symptoms of strangulation do not exist.

In that kind of hernia called *chronic*, the circulation in the part forming the hernia, as well as the peristaltic motion of such parts of the alimentary canal as have been protruded, go freely and regularly on. There are many instances of large herniæ falling down even to the bottom of the scrotum, and continuing there for many years, without producing any interruption to the usual discharge by stool. All that can be done here is, to prevent any accumulation of feces in the intestine, by prescribing a proper diet, and the occasional use of gentle laxatives; and obviating any inconvenience which might arise from the weight of the tumor, by the application of a proper truss or suspensory bandage; to warn them of the risk to which they are constantly liable, and to caution them against violent exercise, particularly leaping, and every sudden exertion. The truss ought to be fitted exactly to the part for which it is intended, for without the utmost nicety in this respect, it must always do more harm than good; for the sole purpose of a bandage, in cases of hernia, is to prevent effectually the falling down of such parts as have been newly replaced. If therefore the pad or bolster of the bandage does not bear properly against the opening upon which it is placed, a portion of gut may slip out, and be materially injured by the pressure of the pad. Fig. 58 represents a truss for an inguinal or femoral hernia of one side, fig. 59 a truss for the same disease in both sides, and fig. 60 a truss for an umbilical hernia.

Operation for the hernia.—The circumstances to be attended to in performing the operation for hernia in general are these. A table of convenient size and height being placed in a proper light, the patient must be so laid on it as to relax the diseased parts as much as possible, and then secured by proper assistance. To lessen the contents of the abdomen as much as possible, the bladder ought to be emptied previous to the operation. An incision is to be made with a common round-edged scalpel through the skin and part of the cellular substance, long enough to allow the stricture to be fully exposed. The rest of the cellular substance is then to be divided with the greatest attention. That part of the muscle forming the stricture or ring must next be laid distinctly in view. A small portion of the

protruding sac must also be exposed; after which the directory (fig. 57.) is to be passed between the ring and the sac. A straight probe-pointed scalpel is now to be introduced into the groove of the directory, and by it the ring is to be dilated till the point of the finger can be introduced. The finger is here considered as the safest director; for it being insinuated into the aperture in the tendon immediately above the protruded parts, the point of the knife is easily introduced upon it; and by keeping the end of the finger always a little before the knife, the opening may be enlarged to any necessary extent without risk of wounding any of the contiguous parts.

By the ease with which the finger is introduced, the operator will be enabled to judge when the ring is sufficiently dilated; and if the strangulation was entirely in the ring, it will now be evident that every obstacle to the reduction must be removed, and of consequence that the prolapsed parts may be returned with little difficulty. If the patient be young, or if the disease has continued a considerable time, such a degree of inflammation frequently ensues in the neck of the sac as to produce thickening and straitness; so that, after the sac and its contents have been entirely freed from the stricture of the ring, the intestines cannot be reduced. We judge this to be the case when, after the stricture of the ring has been removed, the parts prolapsed do not expand into their natural size, and further, when they make resistance when we attempt to return them. In this case, the neck of the sac must be opened with the utmost caution, to avoid wounding the parts within it.

If the hernial sac, under the straitened part of its neck, be thin and transparent, and there is little or no reason to suspect an adhesion of the bowels to the sac, the best method, as Dr. Monro, in his publication on the *Bursæ Mucosæ*, observes, will be to make a small hole in the sac below the stricture, and then to introduce a small furrowed probe, and to cut cautiously upon it. But if the sac be thick and dark coloured, and there is likewise a suspicion that the bowels may adhere to it, the easiest and safest manner will be to make the hole in the peritoneum above the stricture; then to introduce a common probe, bent near its point into a semicircle, with its point directed downwards through the stricture into the sac; and upon the point of it to make, with great caution, another small hole; after which we may either cut upon the probe, or introduce a furrowed probe, and divide the neck of the sac.

After this, the bowels are to be returned by pressure upon the sac, without opening it further; and the sides of the wound in the skin are to be brought together, and kept so by means of slips of adhesive plaster, though stitches made at the distance of a finger breadth from each other will exclude the air, and prevent the return of the bowels more effectually. Over these are to be laid several folds of charpee, and the whole is to be secured by a bandage adapted to the nature of the part.

Subsequent treatment.—The patient, upon being carried to bed, should be so placed as to have the part upon which the operation was performed higher than the rest of his body, or at least as high as the situation of the part operated upon will allow, in order to prevent a return of the disease. After the operation, opiates are particularly useful, and ought to be repeated as circumstances may require. It is likewise necessary that the patient be kept cool. In plethoric habits, blood-letting is proper, together with a rigid attention to low diet. A frequent use of clysters and gentle laxatives, to keep the belly moderately open, ought not to be neglected. When the constitution has been previously much reduced, instead of blood-letting and a low diet, a nourishing regimen is necessary. The dressings ought not to be removed till the third or fourth day after the operation, when the sides of the wound will be found almost adhering together; and if attention be paid to the subsequent treatment, the sore will be generally healed in two or three weeks. As soon as the wound is firmly cicatrized, a truss ought to be properly fitted to the part, and should never, on any future period of life, be laid aside.

When the hernia is of *long standing*, and when there is reason to think *adhesions* have taken place between the sac and bowels, or that *mortification* has already begun, or that some filaments run across the sac and prevent the reduction, or that there is water in the sac, or that the gut is in danger of being entangled from a part of the omentum being down, a different method of operating becomes necessary.

The patient is to be placed as already directed. The operator is to grasp the tumor with one hand, so as to make the skin tense on the fore part of it, while with the scalpel in the other he divides the skin from one end of the tumor to the other. The cellular substance is by gentle strokes to be divided, till not only the ring, but the whole length of the sac, is laid bare. An opening is now, in the most cautious manner, to be made into the sac by slight scratches, to avoid hurting any of its contents.

In making this perforation, which is considered as the nicest part of the operation, considerable assistance is obtained from the use of the small directory, upon the point of which the fibres of the sac are to be successively raised and divided till an opening is made. The opening is to be enlarged till it admit the fore-finger of the left hand, which serves as a directory for conducting the straight probe-pointed scalpel with which the sac is to be divided through its whole length.

The sac being laid open, the parts contained in it ought to be examined with the nicest attention, to discover whether they are all sound or not; and if, upon an attentive inspection, it is found that they are not evidently in a gangrenous state, even although they seem considerably inflamed, they should be immediately returned into the abdomen. When adhesions take place between different parts of

the protruded gut, the greatest caution is necessary in separating them. When one part of a gut adheres so firmly to another as not to be separated but with difficulty, it is much better to return the whole, even in that state, into the abdomen, than to run the risk of hurting the intestine materially by using much force. When adhesions occur between the hernial sac and the gut, or between the gut and omentum, if the filaments producing the connection cannot be otherwise removed, as there is no great hazard in wounding the omentum, and still less in hurting the sac, a very small portion of these may be dissected, and returned with the gut into the abdomen. When the bowels cannot be reduced with ease, the ring is to be dilated by the blunt pointed scalpel in the manner already directed. After returning the contents of the sac into the cavity of the abdomen, it has been proposed by some authors to pass a ligature round the neck of the sac, with a view of procuring a reunion of its sides, so as to prevent a future descent of the bowels; and various other methods, even actual and potential cauteries, have been proposed: but as none of them yet attempted have been found sufficiently to answer the purpose, the only thing that can be recommended is a well-made truss.

When the bowels are actually *in a state of gangrene*, as the returning of such mortified parts might be attended with the very worst consequences, a great degree of caution is necessary. When the omentum is found in a mortified state, as the excision of a portion of this substance is not attended with much risk, it is the common practice to cut away the diseased parts; and to obviate any inconvenience which might ensue from the hemorrhagy, we are advised to make a ligature on the sound parts previous to the removal of those which are mortified; whilst the ends of the ligature being left hanging out of the wound, the surgeon has it in his power to remove them when circumstances appear to render it proper. These ligatures on the omentum, however, are frequently productive of bad consequences. No hemorrhagy of any importance ever occurs from a division of this membrane, even in a sound unmortified state; such parts as have become gangrenous may, therefore, be freely cut off, and the remaining sound parts be afterwards, without the intervention of ligatures, safely introduced into the abdomen. If a vessel of any size in the omentum has been divided, a ligature may be passed above the vessel itself, and the ends left hanging out of the wound; the threads may be afterwards pulled away at pleasure. When a rupture has been of long duration, it sometimes happens, that from the pressure made by the truss, and other circumstances, portions of the omentum are collected together into hard lumps. If these be small, they may be returned into the abdomen without producing any inconvenience; but if from their bulk and hardness they are likely to do mischief, they ought to be cut off. When part of the omentum is to be removed, it ought to be previ-

ously expanded and divided with scissars, which will be more convenient than any other instrument. When again a small portion of gut is found mortified, we are to endeavour, by means of a needle ligature, to connect the sound part of the gut immediately above the mortified spot to the wound in the abdomen already made. By this means, when the mortified part separates, or, perhaps, what is better, when it has been immediately cut off, the fæces are discharged by the wound; and there are different instances where, after such a discharge has continued for some time, the wound has entirely healed.

But when the mortified portion of gut is of considerable extent, and includes the whole circumference of the intestines, all that can be done is to remove it, and to draw, by means of a ligature, the upper end of the gut towards the under, and afterwards connect them to the inner edges of the wound. This at least affords a chance of the ends of the gut being brought to reunite; and if unfortunately that event should not take place, a passage for the fæces will still be secured. All such mortified parts as are to be removed, ought to be cut off, and the remaining sound intestine retained, before the opening in the ring can be dilated with safety, lest the gangrenous portion slip in together with the sound. The parts forming a hernia being all completely replaced, when the sac in which they were contained is found thick, hard, and much enlarged, as in such a state no good suppuration can take place, and as its preservation cannot be in any degree useful, such parts of it as can be cut away with propriety, ought to be removed. All the lateral and fore parts of the sac may be cut off with safety; but as it is commonly firmly connected with the spermatic vessels behind, this part of it ought not to be touched.

Recent Improvements.] On this important branch of surgery various interesting innovations or improvements have been suggested, and of these we proceed to select such as appear to deserve particular notice.

The following strictures on the usual practice in strangulated hernia, by Mr. Geoghegan, of Dublin, appear in the *Medical and Physical Journal*.

Having succeeded in reducing several instances of strangulated hernia by the taxis, where the symptoms were so alarming as to point out the necessity of an immediate operation; the author is desirous of exciting the attention of practitioners to this result; especially as he appears convinced that the practice recommended by the latest writers of character on this subject, is productive of the most dangerous consequences.

“ Mr. Bell,” says he, “ whose work is in the hands of every surgeon, lays it down as a maxim, that we ought always to proceed to the operation, if, after a few hours, two or three at the farthest, the remedies generally recommended do not prove effectual; and he

does not think the operation, abstractedly considered, attended with great danger. If we consult the records of practice, surely we shall find a host of evidence of the fallacy of this author's maxim; I am confident that the experience of every practitioner is in direct opposition to it; I have met with numberless instances, in which not only several hours, but days, have passed over before a reduction by the taxis could be effected in strangulated hernia, attended with singultus, vomiting of feculent matter, &c. and afterward the protruded parts were reduced without operation. Similar cases have occurred to every experienced practitioner with whom I have communicated on the subject; and as to the question, whether the operation is to be held as dangerous, abstractedly considered, I aver that it is imminently so. We know that the danger attendant on every operation of consequence, turns as much upon the peculiarity of the patient's constitution, independent of the disease which it is intended to relieve, as on any other circumstance; the most minute consideration, therefore, should be given to every means of relieving, before it is had recourse to in any case. In the present instance, a subject in full health is suddenly laid prostrate, attacked by a painful affection, which exceedingly deranges the entire system, not habituated to it by gradual suffering; a desideratum preparatory to an operation. Experience instructs us he can ill bear any violence; his intestines are to be exposed to the air, a tendinous part to be wounded, and air may be admitted into the cavity of the abdomen; beside the effects which a slow dissection must produce on a subject just removed from a state of health, surely nothing can be more obvious than that such cases are in principle exceedingly dangerous. The instructions which are given by Mr. Bell and Mr. Pott, as to the method of reducing by the taxis, appear to me not only imperfect but injudicious; they direct that the patient being properly placed, 'the surgeon is to grasp the inferior part of the hernia with one hand, and push upwards, whilst he endeavours, with the fingers of the other, to push forward the parts at the superior part of the tumor.' Let us for a moment consider the state of the parts; a portion of intestine lies without an aperture, through which it is too large to pass; the question then arises, what occasions its bulk? Surely, the nature of the part, the touch, and all the circumstances of the case, clearly evince it to be flatus, and sometimes together with excrement, and an inflamed intestine, whose functions are so far deranged that it cannot act upon its natural contents, so as to move them in their ordinary course. The abdominal ring is in nowise concerned in the disease, only that as it is too small to admit of the return of the inflamed and inflated parts, it unavoidably girds them; and nothing can be more absurd than the idea of relaxing it, as from its structure it must be passive. Let us suppose a ring fixed upon the neck of an inflated bladder, and that it is desired that the bladder should be passed through the ring, could any thing be more erroneous than to endeavour to push forward, and upwards, or any way, with-

out removing the air which occasioned the resistance? The cases are similar; and nothing can be more obvious than that every effort should be made to lessen the bulk of the hernia, and none to push it through the ring; it will pass in of itself after the air has been extricated. It is observed by those authors, that a gurgling noise is always heard on the passing up of the intestine, which they merely mention, but do not insist upon, as the great and principal circumstance to be attended to in forming a just opinion of the mode of treatment. The mode of practice which I pursue, founded on the preceding principle, is as follows: I expose the entire body to the cold, naked, open the windows, &c. and apply cloths to the part, wet every ten minutes, with a solution of muriated ammonia in vinegar and water; if ice can be procured, I prefer it. The patient generally complains much of the cold, and shivers, a desirable circumstance, as it induces such a collapse of the entire surface, as greatly to assist our intention of condensing and expelling the air from its imprisonment, after about an hour spent in this way without touching the parts with the hands, or any effort by the taxis, as generally practised. Let the palms of the hands be applied to the sides of the hernia, gently to press them towards each other, with a view to assist in propelling, not the intestine, but its contents, the air, &c. through the ring. In one instance I succeeded in this way on the eighth day, in another on the sixth, after the strangulation had set in in both, attended with vomiting of feculent matter, hiccup, &c. Many efforts had been made in the usual way of endeavouring to force the intestine upwards and forwards, which, I am of opinion, always exacerbates the symptoms. In another case, the disease had existed about twelve hours; the volume protruded was immense, and the symptoms ran exceedingly high; the patient was of a remarkably robust habit. After taking off about 20 ounces of blood, and having applied the cold solution for some time, I endeavoured with my hands to assist in extricating the air, but was unsuccessful. Being obliged to go away, I directed that he should remain naked, exposed to the cold, and to persevere in the cold fomentation. On my return, after half an hour, his rupture had disappeared. He told me that he heard a noise as if wind had rushed out of it, and that it went up of itself. Some practitioners apprehend danger from the application of cold to a part so much inflamed; but the scrotum and sac are secure intermediums to moderate its operations on the intestine; and experience proves that danger is not to be dreaded. From these considerations, I presume, it is obvious that the directions given by most authors are not calculated to produce the desired effect, particularly the operation of pushing the inflamed and inflated parts through the ring, which is, *prima facie*, impossible; that the practice of condensing and extricating the air, has a rational foundation; and that the sole attention of the surgeon ought to be directed to that end."

Mr. Geoghegan concludes by presuming it to be understood that *bubonocoele* is the disease on which he treats.

Some difference of opinion on the subject of the *degree of force* necessary to be employed, is evinced in the following remarks on *incarcerated herniæ*, published in the same work, by Mr. Ward, surgeon to the Manchester infirmary:

That gentleman recommends strongly the *inverted position* whilst the taxis is applied; by which it is meant, that the patient should be held by the legs on the shoulder of an assistant; his body being allowed to hang down. Another assistant is then to support his head and shoulders, and to incline them a little forwards, so as to relax the abdominal muscles, and by that means favour the return of the intestine. The effects of this practice are evinced by Mr. Ward in the following cases:

CASE I. "May 25, 1795, Wm. Bellows was admitted into the Infirmary with a scrotal hernia, which had been in an incarcerated state twelve hours. He complained of great pain, and had vomited frequently. He was bled copiously, and had a clyster given, which produced a trifling evacuation only.

"While the warm bath was preparing, an assistant was directed to sit upon the bed with his back towards the patient, and to grasp his legs (which were put upon his shoulders) just above the ancles, and to rise up with him upon his back; another assistant was then directed to support his head and shoulders, and to incline them a little forwards, principally with a view to relax the abdominal muscles, but in part to prevent the weight of the body falling wholly upon the legs. He was held in this posture ten or fifteen minutes while the taxis was applied, and, by repeating the same process three or four times (allowing him to rest at intervals) the hernia was reduced, without having recourse to the warm bath.

"Aperients and a truss were directed for him, and he was discharged cured on the 30th.

CASE II. "January 15, 1796, William Howarth was admitted with an inguinal hernia, which had been incarcerated twenty hours. The most urgent symptoms were singultus, vomiting, and pain.

"After sixteen ounces of blood had been taken from his arm, he was placed in the inverted position, and the taxis was applied, at intervals, till the warm bath was ready; several efforts were also made while he was in the bath to reduce the hernia, but were ineffectual. He continued in the bath till he began to grow faint; he was then removed to bed, and, in about an hour after, the reduction was completed, by again having recourse to the inverted position and the taxis.

CASE III. "March 4, 1796, Job Morton ruptured himself by endeavouring to stop a restive horse. Several hours had elapsed when he sent for me. The hernia was an inguinal one, in a tense and painful state. He had vomited several times. The means

made use of were venæsection, the inverted position, and the taxis, which were happily successful.

CASE IV. "Jan. 20, 1798, Richard Perry, ætat. 40, was admitted with an incarcerated inguinal hernia. The symptoms, mode of treatment, and the result, were exactly similar to the first case. He was discharged cured in a few days.

CASE V. "William Bellows was admitted the second time (see Case I.) About sixteen hours had elapsed since he found himself unable to return the hernia. He was bled, and the warm bath was ordered; but before it was ready, the complaint was removed, by placing him in the inverted position, and applying the taxis.

CASE VI. "March 17, 1799, William Bellows was brought to the Infirmary at three o'clock, A. M. About six hours had elapsed since he found himself unable to reduce his hernia.

"He complained of great pain, and hiccuped at times. Attempts were made, but in vain, to reduce it by applying the taxis, having previously raised his hips by placing pillows under them. About a pint of blood was then taken from his arm; a purging clyster was injected, which brought away a stool in about half an hour; a cold solution of sal ammoniac was applied to the part affected, and castor oil was ordered internally, which procured him several evacuations.

"Between seven and eight o'clock he was put into the warm bath, and felt easier afterwards, though the tumor continued of the same size, but felt rather softer. About two hours after he left the bath, he was held by the legs on the shoulders of an assistant, and the taxis was applied nearly a quarter of an hour, but the hernia was not reduced; he was then laid down in bed, and a sickness came on, and during the continuance of the sickness it went up.

CASE VII. "May 13, 1799, James Taylor had experienced the most excruciating pain four hours, from an incarcerated inguinal hernia.

"The inverted position was not resorted to for want of proper assistants; but the patient's head being lowered, and his hips elevated as much as possible, brought him nearly into that position; and the hernia was speedily reduced by applying the taxis."

Mr. Ward adds to these cases the following remarks:

"If," says he, "we admit the propriety of placing the patient, when the taxis is to be applied, in such a position as may most effectually co-operate with the surgeon, the inverted position seems in every point of view fairly entitled to a preference, not only in the inguinal and scrotal, but also in the congenital and femoral herniæ; and whoever will reflect on the connection which subsists between the parts above and below the stricture, will be inclined, I think, to draw a similar conclusion.

"But this is a matter which does not rest on theory entirely; the experience I have already had of its utility, enables me to say, that more benefit actually takes place from the taxis when the patient is placed in an inverted position, and with less violence or injury to

the displaced viscera; than when any other position is made use of; an equal degree of pressure being applied in both cases.

“The alarming situation of William Howarth (Case II.) induced me both to repeat the taxis oftener, and also to apply a greater degree of pressure before the resistance could be overcome, than I had ever done before; and it is to these causes, and having availed myself of the most favourable position, that my success is to be attributed, not only in this but in the three succeeding cases:

“I should be sorry to be wanting in that respect which is due to the opinions of men deservedly eminent in their profession; but I must beg leave to withhold my assent from the injunction which would limit the surgeon to gentle pressure in every instance: ‘A little time and pains spent in this manner will frequently be attended with success, and obtain a return of the part; but if it should not, and the handling of it (which I must repeat should always be gentle), becomes painful and very fatiguing to the patient, we are advised to desist for a few hours, and try the effect of other means.’

Potts' Works, vol. ii.

“‘But this must always be had in view, that any pressure that is applied must be of the most gentle kind; for every thing of this nature that creates much pain, is very prejudicial, and ought by all means to be avoided.’—*Bell's Surgery, vol. i.*

“Whoever regulates his practice by the above rules, will, I believe, rarely succeed in reducing those herniæ that are accompanied by a considerable degree of stricture.

“I trust, however, it will not be imagined I am an advocate for a rude or violent method of applying the taxis; every addition to the pressure applied, should certainly be made in a cautious and gradual manner; but at the same time it will be incumbent upon us to remember, that should we fail in reducing the hernia, the patient must either submit to an operation, which often terminates fatally even when performed under the most favourable circumstances, or to the almost inevitable alternative of a gangrene taking place, with all its attendant evils.

“In the treatment of a complaint so dangerous in its nature, and so rapid in its progress, that the fate of the unfortunate sufferer is frequently decided in a few hours, it appears highly injudicious to allow a considerable portion of that precious time (which ought to be appropriated to the use of the most efficacious remedies) to be occupied in applying cold liquids, or ice, to the part affected*.

* Mr. Potts' remarks in his Treatise on Hernia, when cautioning his readers against employing fomentations, cataplasms, and embrocations, are very forcible, and appear to me not very inapplicable in the present instance. “I know that in this I differ from the majority both of writers and practitioners; but having (as I think) truth on my side, I do again venture to say, that I verily believe, that the confidence which has been placed in such kind of applications, has destroyed many more lives than it has saved. A hernia, with

"Where cold topical applications are so managed as not to divert the attention of the surgeon from measures of more essential importance, my objections will not apply; but having reason to believe that great confidence is sometimes reposed in them, and being convinced of their general inutility, I cannot help thinking it would be a happy circumstance were they totally discarded in the treatment of every species of incarcerated hernia.

"In the intervals, when patients of the above description are not undergoing the taxis, or using the warm bath, might it not promote the object in view (or at least retard the progress of inflammation) were they to be laid in bed with the head and shoulders lowered, and the hips elevated considerably, instead of being allowed to lie in the usual horizontal position?

"However trivial such a circumstance may appear, nothing ought to be considered beneath notice, which may in any degree tend to promote ease, or diminish danger."

Mr. Simmons, of Manchester, published a case, in which good effects were attributed to the exhibition of digitalis. His colleague at the infirmary, however, Mr. Killer, in a subsequent paper, dissents from this conclusion. The patient was admitted under the care of Dr. Taylor, who directed several leeches to be applied to the scrotum, a large dose of calomel, and that he should go into the warm bath. By these means the volume of the tumor was considerably diminished; however, as reduction was still impracticable, a consultation was held, and the plan of treatment described by Mr. Simmons agreed upon. A grain of digitalis was given, and in a quarter of an hour after, and before it had produced any sensible effect, a strong tobacco clyster was thrown up. This brought on sickness and violent retchings instantaneously, which continued till the patient was reduced to a state of asphyxia. Whilst in this condition, the hernia was reduced with tolerable facility.

Mr. Killer does not deny that the addition of a sedative power, like that of digitalis, might increase the conjoining debilitating effects of bleeding, the warm bath, and tobacco clysters, but considers the exhibition of the former as no other than a slender auxiliary to such powerful means.

The invaluable Cases and Observations on Strangulated Hernia, by Mr. Home, which appear in the Transactions of the Society for

painful stricture, and stoppage of stools, is one of those cases in which we can seldom stand still even for a short space of time; if we do not get forward, we generally go backward; and whatever does no good, if it be at all depended upon, certainly does harm, by occasioning an irretrievable loss of time: of this kind I take the cataplasm and embrocation to be; while the former is applied, or the latter used, no other more powerful means are made use of; and though it has the appearance of doing something, yet I fear it is little more than specious trifling; especially if the case be at all pressing."

promoting Medical and Chirurgical Knowledge, are by no means to be passed by. We shall, therefore, close this section by giving them in detail.

"In cases of strangulated hernia," says Mr. Home, "some require an operation to be performed a few hours after strangulation has taken place, while others admit of an operation being much longer delayed.

"There are general symptoms common to all such cases, but these different kinds appear to have also symptoms peculiar to themselves. To ascertain these peculiar symptoms would enable us to decide upon the nature of each particular case, and to determine the most proper time for performing an operation."

With a design of throwing some light upon so important a subject, Mr. Home annexes the following cases:

CASE I. "Elizabeth Walbank, fifty-four years of age, of a spare habit of body, had for seven years a femoral omental rupture on the left side, which had never been reduced. On the 8th of October, 1794, at eleven o'clock in the evening, immediately after a severe fit of coughing, she felt a pain in the part, and had a violent attack of vomiting, accompanied with a general tenderness over the belly. The retchings returned at intervals during the night; next day all these symptoms became more severe; some blood was taken from the arm, and attempts were made to reduce the rupture, but not proving effectual, she was sent to St. George's hospital, and became my patient. I saw her," says Mr. Home, "at eleven o'clock in the evening, exactly twenty-four hours after the symptoms of strangulation had taken place. Her pulse was quick and small, her skin dry and hot to the touch, the retchings were extremely violent, attended with pain, and a sense of dragging down (as she expressed it) from the navel, which returned about every five minutes; there was also a great degree of tenderness over the belly, and the tumor itself gave pain when handled.

"The tumor was about the size of half an orange, was distinctly to the feel composed of omentum, and was so situated as to preclude all examination of Poupart's ligament by the finger; nor could the hernial sac, on account of its distension, be removed from that situation. Any efforts to reduce a rupture, so circumstanced, are generally unavailing, and in this case they did not succeed. The warm bath was employed, and the fumes of tobacco were injected into the rectum, but no abatement of the symptoms took place.

"The woman suffered so much from the vain efforts to vomit, and the general state of irritation, that she readily consented to have the operation performed, as she felt within herself that she could not survive unless something effectual was done for her relief.

"When I laid open the hernial sac in the usual manner, nothing except omentum was brought to view; but when this was spread out, and turned up towards the abdomen, a small tumor, formed by

a doubling of the intestine, was discovered at the bottom of the sac, which was so much pressed upon by Poupart's ligament, as not to admit the end of a probe to pass between them. The gut was very much inflamed, its surface was perfectly smooth, and uniformly of a dark red colour, but as mortification had not taken place, it was thought to be capable of recovery, and was, therefore, as soon as the ligament was divided, returned into the belly. The portion of omentum adhered to the orifice of the hernial sac, and was found upon trial too bulky to pass through the orifice which led to the abdomen; it was therefore, from necessity, removed; this was done by dividing it in its expanded state, near to the orifice of the sac, with a pair of scissors; two arteries on the cut edge bled so violently as to require being secured by ligatures, the ends of which were brought out at the external wound, and the whole was superficially dressed*.

"As the portion of gut was very much inflamed, twenty drops of tincture of opium were given, immediately, to lessen the irritation produced by the inflammation, and repeated at four o'clock in the morning.

"January 2d. The retching was entirely stopped, and the pain in the belly much abated. A clyster of warm water was injected, and fifteen drops of tincture of opium given in a draught, both of which were repeated at night. The clysters were only retained about an hour.

"3d. She was tolerably easy, but languid; the clyster of warm water was repeated; at ten o'clock in the evening she had a pain in the lower belly, for which she took twenty drops of tincture of opium: the same quantity of opium, in consequence of a continuance of the pain, was repeated at one in the morning.

"4th. The pain continued, accompanied with a constant desire to make water; the belly was fomented, after which she made water freely, and this relieved the pain in the belly. At two o'clock she took an ounce of a mixture containing 3vj of infusion of senna, 3vj of tincture of senna, and ʒiij of kali tartarificatum, and in an hour had a motion; her pulse was soft, and beat an hundred times in a minute; her thirst continued, but was relieved by sucking oranges. She took some panada, sago, and her usual opiate at night.

"5th. Had a confusion in the head, with disturbed dreams: these were considered as effects of opium, which was therefore left off. The wound had a favourable appearance.

"7th. The ligatures came away, and the wound was going on kindly.

* Mr. Pott disapproves of tying the omentum, as inflammation often extends from the part included in the ligature along that membrane, and destroys the patient. He also says, that hæmorrhage will probably never take place on cutting it, but this case proves the reverse.

"9th. She became restless, feverish, languid, and had no appetite for food; all these symptoms increased on the 10th, and on the 11th, at night, she died, exactly ten days after the operation.

"On inspecting the body after death, the strangulated portion of intestine, extending to two inches and a half of the ilium in length, was found to have exactly the same appearance as it had when exposed during the operation. Its internal membrane was extremely vascular, and had an inflammatory exudation of coagulated lymph adhering to different parts of its surface. There was no appearance of inflammation on the omentum. So large a portion of it had been removed during the operation, that only an inch of its anterior part remained attached to the transverse arch of the colon. In several parts of the abdomen there were slight adhesions between different convolutions of the intestines.

"In this case the symptoms were, from the beginning of the attack, those of an inflamed intestine: the operation arrested the progress of the inflammation, and prevented mortification from taking place; but the inflammation had proceeded too far to admit of resolution.

CASE II. "Edward Linton, sixty-four years of age, had for nine years a scrotal hernia on the left side, which was in general without much difficulty reduced. On the 26th of January, 1795, about four o'clock in the morning, after a fit of coughing, the tumor was increased by the gut being forced down, as had frequently happened before, but symptoms of strangulation now took place. In the course of two hours a vomiting came on, which ceased as soon as the stomach had discharged its contents, nor did it return till something was again received into the stomach. He continued in this state, and the vomiting was rendered frequent by the incessant thirst obliging him to drink frequently. At nine o'clock on the evening of the 29th, he was brought to St. George's hospital, and put under my care. His pulse was an hundred in a minute, and by no means unusually small; his tongue was white, his mouth dry, and he was much distressed by hiccup; there was no pain extending over the belly, or in the tumor formed by the rupture, unless what arose from its having been much handled.

"Upon finding my attempts to reduce the rupture ineffectual, I cut down upon the ring of the external oblique muscle, and divided it with a view of taking off the stricture, relieving the symptoms, and rendering the parts afterwards more easy to be reduced. The tumor immediately felt softer, and appeared to be diminished in size; he was therefore left in this state, the parts having been superficially dressed, till next day.

"January 30. The symptoms were in no respect relieved, and the rupture could by no means be reduced; it was therefore thought right to perform the operation. The sac was laid open, was found to be extremely thick, and contained about an ounce of water; a

portion of the intestine was discovered closely embraced by the orifice of the sac, in appearance free from inflammation, and was returned with some difficulty into the cavity of the abdomen. The wound was superficially dressed, and an opiate was given to quiet the stomach.

"31st. The hiccup and vomiting continuing, opiates were given; a clyster composed of a pint of milk and two drachms of aloes, was injected; and another of the same composition was repeated in a few hours, both of which were returned without relieving the constipation.

"February 1st. No abatement of the hiccup and vomiting. A clyster, consisting of a pint of milk, with half an ounce of aloes, was thrown up without procuring a motion. His pulse was full and strong, there was a great degree of inflammation in the wound, extending up to the spine of the ilium, and down to the testicle: ʒviij. of blood were taken away from the arm, and two grains of opium were given at bed-time.

"2d. The vomiting was less frequent; he took five grains of calomel and ten of jalap, about noon, and the aloetic clyster was administered as before, which procured a stool in the evening; this was the first evacuation since the strangulation, a period of eight days in all, and three from the time of the strangulation being removed.

"3d. The vomiting abated, but the hiccup was troublesome; the calomel and jalap were repeated, and a clyster of warm water was thrown up, but no evacuation took place.

"4th. The calomel and jalap, and the aloetic clyster, were repeated. He had a stool in the afternoon, and another in the night.

"5th. The vomiting entirely ceased, but the hiccup, and a degree of nausea, continued.

"6th. "Ten grains of calomel, and ten of jalap, were given, and he had four copious evacuations.

"7th. The hiccup continued. In the afternoon the calomel and jalap were repeated.

"8th. He had a good night, the hiccup being only at intervals; he had no motion; the calomel and jalap were therefore repeated.

"9th. The hiccup had not entirely left him, and he had two copious stools. The inflammation had spread from the external wound to the testicle, and suppuration had taken place through the whole extent of the scrotum; a hæmorrhage took place in the evening, which made the removal of the testicle necessary, in order to secure the vessel. He lost above a pound of blood, which made him low and faint; and he was directed to take three grains of opium.

"10th. He had a tolerable night, the hiccup being entirely gone. From this time there were no symptoms of the bowels being affected. In three days the evacuations became regular, and afterwards, when

otherwise, the bowels were readily acted on by mild laxatives. He gradually recovered his strength, and in the beginning of April was quite well."

Mr. Home observes on this case, that there was no inflammation in the strangulated part of the gut, though it remained four days and a half in that state. The symptoms arose entirely from the obstruction to the passage of the contents of the bowels, producing irritation in the stomach, and the other effects which the author has enumerated.

"CASE III. Margaret Collins, aged forty, had for a year a femoral rupture of the left side, which was readily reduced. On March the 28th, about five in the evening, while standing on a ladder, cleaning some wainscot, a portion of the gut came down. She felt immediately a darting pain between the navel and pit of the stomach, very quickly followed by giddiness, sickness, and vomiting, which did not cease upon the stomach being emptied, but continued for some time, and returned at intervals. Whatever was taken into the stomach was immediately rejected, and at such times she felt a very severe pain in the tumor, and the region of the stomach.

"29th. The symptoms continued the same, and for about ten minutes she had hiccup.

"30th. About six in the evening, she was brought to St. George's hospital, and fell under my care. Her pulse was frequent, her tongue white, and she had a great degree of thirst. The tumor was less than a hen's egg, and situated directly upon Poupart's ligament. Fourteen ounces of blood were taken from the arm; attempts were made to reduce the rupture, which proving ineffectual, recourse was had to the warm bath; tobacco fumes were injected, and ice was applied externally, but all without success. The symptoms suggested the opinion of an inflammation having taken place in the portion of strangulated intestine. They were not, however, in the same degree as in the case first stated, as the pulse was less contracted, the retchings less frequent, and the general irritation and pain in the belly less violent. It was thought proper to proceed to the operation, which was performed at eleven at night.

"When the hernial sac was laid open, a small fold of intestine was exposed, having its external surface very vascular, and a shaggy appearance, from a covering of coagulating lymph which adhered to it; this was become vascular: the gut itself was also much thickened in its coats. The stricture was removed by dividing Poupart's ligament, the gut was returned into the belly, the external wound was superficially dressed, thirty drops of tincture of opium were given in order to allay irritation, and in the night a clyster, consisting of warm water, was thrown up. Immediately after the operation she appeared to be relieved, and the retching entirely ceased.

" 31st. Her pulse was an hundred and two in a minute. She was very thirsty, had hiccup for about ten minutes; had a pain in the lower belly, which went off upon making water. She took an ounce of the laxative medicine which was exhibited in the first case, but without effect; at noon she took ten grains of calomel and ten of jalap, and at four in the afternoon a clyster was thrown up, consisting of a pint of milk, with $\frac{3}{4}$ ss of aloes: at ten at night the calomel and jalap were repeated, with a view to empty the bowels as quickly and completely as possible, on account of the inflammation in the strangulated portion of the intestine.

" April 1st. She had two copious stools; her bowels were easy, except that flatulency sometimes took place. She was less thirsty, the pulse soft, low, and ninety-four in a minute. She had another motion about four o'clock. In the evening the jalap was repeated, with seven grains and a half of calomel.

" 2d. She slept well in the night, was free from pain, her pulse soft, and eighty-two in a minute. The calomel and jalap were repeated, and as she had no stool, the calomel was again repeated at night alone.

" 3d. As she had no stool, an aloetic clyster was thrown up as before; the pulse was now only eighty. At noon she took twenty grains of jalap, and at two had a stool, and in the evening three more.

" 4th. She had another motion in the night, after which she was griped, but the griping went off on taking twenty drops of tincture of opium; she rested well, and her pulse was seventy-five.

" After the 4th she had no complaint in her bowels, the wound went on kindly, and she got well in a fortnight.

" In this case the symptoms indicated inflammation, and the appearance of the intestine, when exposed in the operation, proved that inflammation had taken place. There were also the symptoms of compression having obstructed the bowels, as they remained in an indolent state for some time after the operation."

Mr. Home's reflections, which follow, on these cases, are particularly judicious. He says,

" From these cases we learn, that the symptoms correspond with the state of the intestine. When the stricture is only sufficient to compress the intestine, and to prevent the contents from passing through the strangulated part, there is vomiting, hiccup, thirst, and general uneasiness, which symptoms come on some hours after the protrusion of the gut, and are very slow in their increase.

" When the stricture is in so great a degree as to produce inflammation on the compressed part of the gut, the symptoms come on immediately; the vomiting does not cease upon the stomach discharging its contents, but the retchings continue; there is a considerable tenderness over the whole belly; the pulse is quick and very small, and the spirits of the patient are much depressed. These

symptoms are more or less violent, and their progress is more or less rapid, in proportion to the degree of the inflammation. If it only produces adhesions, the pulse is less contracted, there is less tenderness over the abdomen, and less depression of spirits.

“ When the stricture is so tight as to obstruct the circulation of the blood in the part, all these symptoms are met with in the greatest degree of violence; an unusual coldness is felt over the surface of the body, and mortification takes place in the strangulated portion of the intestine.

“ As in all the cases which I have stated, there was an opportunity both of tracing the symptoms, and examining the state of the intestine the conclusions which have been drawn are the more to be depended on; and should they be confirmed by future observations, they will assist us considerably in judging of the expediency of performing the operation at an earlier period in some cases than in others. I am induced to believe, that they are strongly in favour of immediate operation in cases which are in general thought to admit of delay.

“ The femoral rupture, on account of the strength of Poupart's ligament, will be more liable to have the parts compressed in a greater degree, and consequently to be more violently affected by inflammation.

“ In such cases the operation should be sooner performed; whereas, on the contrary, surgeons have been more inclined to delay it, from the difficulty and danger arising from the parts which are liable to be hurt in performing the operation.

“ Constitutions are very differently affected by the same local mischief; some patients recover after mortification has taken place in the portion of strangulated intestine, while others sink under a much less violent degree of inflammation; it is therefore in general right, even in the most hopeless cases, to perform the operation. There is, however, one symptom that comes on in the last stage of this disease, which appears to be the immediate forerunner of death, and after it has taken place, I apprehend the operation will always prove ineffectual. This is a general coldness, attended with moisture over the surface of the body; it is, to the feel, even colder than the skin of the same person when dead; but the real degree of cold (I believe) has never been measured by a thermometer.”

Mr. Home concludes this interesting paper by observing, that, in every case which had occurred to him, where this symptom had taken place, the patient was lost. In some the operation was performed, in others not; but in all, the patients continued to sink gradually, and died in less than twenty-four hours.

SECT. II. Of BUBONOCELE, or INGUINAL and SCROTAL HERNIA.

This species of hernia is formed by a protrusion of some of the abdominal bowels through the rings of the external oblique muscles. It is known by the general symptoms of hernia already enumerated, and by a soft and somewhat elastic swelling, beginning in the groin, and descending by degrees into the scrotum in men, and into the labia pudendi in women. When the hernia contains omentum only, the swelling is both more soft, compressible, and more unequal than when the gut alone is down; the scrotum becomes more oblong than in the intestinal hernia; and when the quantity of omentum is large, it is also much more weighty than a gut rupture of the same size: but frequently the tumor is composed of both gut and omentum, and then the distinguishing symptoms of each can never be so clearly marked.

Distinctions.] Bubonocoele may be confounded with certain other diseases; but is distinguished by the following marks which are present in these disorders, while the symptoms of hernia are absent: from venereal bubo, by the presence of that incompressible hardness with which all such swellings are at first attended, and by the fluidity of matter which in the suppurative state is always observable: from hernia humoralis; or swelling of the testis, by the absence of the hardened and enlarged state of the testis and epididymis, and likewise of the pain, the tumor of the testicle being remarkably heavy in proportion to the bulk, and the spermatic process being commonly free from swelling. In the hernia humoralis also the intestines are unobstructed, and the general symptoms of hernia are wanting. From the hydrocele of the tunica vaginalis testis, by the tumor generally feeling more smooth to the touch than in hernia, by the swelling here beginning in the under part of the scrotum and ascending, by the spermatic cord being always free and distinct, and by a fluctuation being evident. From hydrocele of the spermatic cord, sometimes with much difficulty, and therefore it requires here particular attention. In every case of tumor in the testes, where the most perfect certainty is not obtained, and when it is necessary to have recourse to an operation, the surgeon ought to proceed as in a case of real hernia.

Treatment.] The treatment of bubonocoele is the same with that already advised in the treatment of hernia in general, only making allowance for the situation of the disease. In attempting the reduction by means of the hand, the pressure should be obliquely upwards and outwards, corresponding with the ring of the abdominal muscle. In performing the operation, the patient should be laid on a table, with his head and body almost horizontal, whilst

at the same time his buttocks are somewhat elevated by pillows placed beneath them. The legs hanging over the edge of the table ought to be separated, so as to admit the operator between them; and should in that situation be firmly secured by an assistant on each side, who should take care to keep the thighs so far raised as to relax all the abdominal muscles. The parts being previously shaved, an incision must be made with a common round-edged scalpel through the skin and part of the cellular substance, beginning at least an inch above the superior end of the tumor, and continuing it down to between two and three inches below the ring.

Although, in by much the greatest proportion of hernial swellings, the spermatic vessels lie behind the protruded parts, yet on some occasions they have been found on the anterior part of the tumor; so that in order to avoid the risk of wounding them, as soon as the skin is divided, the remainder of the operation ought to be done in the most cautious manner, care being taken to avoid every large blood-vessel which makes its appearance. The ring must now be laid distinctly in view; a small portion of the protruding sac must also be exposed; after which the director is to be introduced between the ring and the sac, placing the point of the instrument obliquely upwards and outwards. A blunt-pointed bistoury is now to be introduced into the groove of the director, and by it the ring is to be dilated till the point of the finger can be introduced. The director is now to be laid aside, and the finger used in place of it through the rest of the operation. After the operation is finished, the dressings are to be applied, and the whole secured by a T bandage, or suspensory bag, properly stuffed with soft lint.

The patient, on being carried to bed, should have a pillow under the buttocks, to elevate them a little above the rest of the body, and should be treated in the manner which has been already directed. As soon as the wound is firmly cicatrized, a truss ought to be properly fitted and used through the rest of the person's life. Females are liable to this species of rupture as well as men: and as the opening in the external oblique muscle is exceedingly similar in both sexes, the treatment of this species of hernia in females is very similar to what is found to answer in men. When clysters, blood-letting, and the other remedies formerly enumerated, fail, the same operation of enlarging the opening in the tendon of the oblique muscle is here equally proper as in the other sex.

As modest women are apt to conceal disorders of this kind, they may frequently happen when the surgeon receives no information about them. Whenever, therefore, such symptoms of colic occur as give reason to suspect the existence of hernia, a particular examination ought always to be made, in order, if possible, to detect the cause of the mischief, from the removal of which alone a cure can be expected.

See the remarks of Mr. Geoghegan in the preceding section.

SECT. III. *On the MECHANICAL ASSISTANCE to be afforded in Cases of RUPTURE.*

As it is a fact universally acknowledged, that most if not all the benefit that patients who are afflicted with ruptures can derive from the assistance of art, if exerted with a view to the radical, or only to effect a palliative, cure, is from the skilful application of proper trusses, a knowledge of the principles upon which those instruments should be constructed becomes of the utmost importance: to this subject we have paid much attention, and shall, as briefly as possible, mention the result of our enquiries.

In the capital, several persons offer to public notice what they call new inventions of this kind, but, upon a minute investigation, every one of these appears to resemble some bandage that is described by the older writers on this subject; and as these were laid aside upon the invention of what is called the elastic truss, which has been universally used for more than sixty years, we have not hesitated to recommend *that* as the most proper to be adopted in most cases. We advise those who have occasion for them to procure them from those makers whose known skill and reputation afford a well-founded hope that they will be properly executed; in this much caution should be used, as it is notorious that many workmen of the most ignorant description pretend to make and even apply trusses, mostly to the injury, and often to the destruction, of their patients. The effect of this rashness in ignorant men cannot be too carefully guarded against; but, as there are situations where better cannot be found, we shall endeavour to give such an idea of the principles upon which they should be constructed as will enable our readers to direct a common workman to make them much better than he would otherwise do. Upon this subject we have been favoured with the following communication by Mr. Sheldrake*, whose reputation in this way, as well as in other branches of mechanics that are connected with surgery, is perfectly well known.

“As every rupture, when the patient is standing erect, but is otherwise inactive, is protruded, by the mere effect of gravity, with

* As we wish to give an authority for what we introduce, and are desirous that the author of every communication we are favoured with should receive the share of credit that may be due to his work, we are here bound to acknowledge our obligations to Mr. Timothy Sheldrake (No. 50, in the Strand), author of *Observations on the Cure of Ruptures, &c.* and of an *Essay on the Distorted Spine*; and who has long been distinguished for his method of treating, on entirely new principles, distortions in the legs and feet of children and adults. We are the more particular in the terms of this acknowledgment, from the necessity there is of distinguishing *this* gentleman from a person of the same name, engaged in the ordinary business of a truss-maker, in his immediate neighbourhood.

a force proportioned to the weight of the parts, and as the same rupture, when the patient is in a state of exertion, is protruded with a force equal to the weight of the parts and the quantity of exertion that is made, it is evident that a truss which is intended to keep up a rupture of a given size, in a patient whose mode of life is known, should possess a degree of strength more than equal to any action the parts may be thrown into by any exertion the patient may use: it is to be remarked too, that two ruptures of the same size, the one consisting of omentum, the other of intestine, will require trusses of different degrees of strength to keep them up, supposing the patients to use equal exertion. There are other circumstances to be considered which prove that a certain degree of force is indispensably necessary to keep up a rupture of any given size, that a large rupture requires more force to retain it than a small one, and of course that a truss for the one cannot be so easy to the wearer as that for the other. This is too evident to require mentioning to a well-informed mind, but many patients are too irritable to believe it; they are misled by the pretences of those who foolishly as well as falsely pretend that the largest rupture may be kept up without the truss being felt.

“It is certain however, that many patients suffer very severely and much unnecessary pain from the pressure of trusses improperly made or injudiciously applied; and this they, as well as some designing men, are willing to attribute to the species of truss, when in fact it is only a fault from the improper manner in which that particular truss is constructed, or the injudicious manner in which it is applied; for this, perhaps, there is no other remedy than to apply to those men whose experience makes them equal to the task; for on this subject much knowledge is gained by experience that cannot be obtained in any other way: yet, taking it for granted that a certain degree of force is requisite to keep up every rupture, some rules may be given to apply that force in the most effectual manner, and with the least inconvenience to the wearer. There are two efficient parts in an elastic truss, viz. the springs and the pad; the latter is of some substance sufficiently firm to preserve that form which is once given to it, and must be made of that form which is best adapted to the state of the rupture on which it is to be applied. The variation of different cases in this particular is so great that perhaps there is no form that human ingenuity can devise that has not already been used in some cases: the spring is intended, by its pressure, to keep the pad to its place and prevent the extension of the rupture: the covering is merely to guard the body from injury, and is not now the subject of consideration.

“The spring should go so far round the body that the part which lies upon the back should take a firm position upon that part, and form a basis from which the action of the whole is directed to the pad, and the compression is made by contraction of that part of the

spring which lies upon the side. A spring of this kind can only act well by contraction, when the contracting part is circular: yet, as the body in that part is seldom round, and it is always desirable that the truss should fit as close to the body as possible, a considerable difficulty arises from the necessity of reconciling these seeming contradictions: this, indeed, is one great difficulty in the art of making trusses; and, as many of the unqualified persons who attempt it find it insurmountable, their trusses are too commonly both awkward and painful. Another great difficulty is to apply the requisite degree of force, so as to produce the least possible inconvenience to the patient; the manner of doing this may perhaps be understood from the following description. The strength and flexibility of a spring depend upon two circumstances; viz. the size of the metal it is made of, and its capacity for being extended. If two springs are made of the same sized metal, and one of them is formed into a circle whose diameter is half as much as that of the other, its strength will be double when they are extended to the same size; or it will be equal in strength to the other when it is half extended and the weaker spring is opened to its full extent. The whole force with which any spring is capable of acting must be equally divided between the point of its extreme extension and that point of its contraction when it is perfectly at rest; if, therefore, these two springs were applied on the same patient, and if the weakest had sufficient strength to keep up his rupture, it would do so with ease; and the strongest would likewise produce the effect, but with double the pressure requisite, and consequently with so much unnecessary pain as would be produced by one half the pressure it makes.

“ That truss will be easiest, then, which is the most flexible; but it will only be effectual when applied to a slight rupture in a patient who makes but little exertion; when the rupture is large, and it is requisite the patient should make violent exertions, a strong truss becomes indispensably necessary, and it is often a difficult matter to adapt it so as to answer its purpose effectually, and at the same time be so easy as to enable the wearer to take his accustomed exercise with tolerable ease. In speaking *generally* on the subject, it may truly be said that the simple elastic truss is the best; as it will, if skillfully made and properly adapted, answer extremely well unless in very large ruptures, or for patients who are required to make very violent exertions; in these cases the simple elastic truss is liable to some objections which may be obviated by a truss of a different kind.

“ The effect of the simple truss is produced by its contracting round the body; now, although this contractile action may be so regulated in general and in ordinary cases, as to produce no inconvenience, there are many in which the proper pressure cannot be produced without inconveniences of the most serious kind. If we advert to the case of a very fat man, who has a very large rupture,

and is required to exert himself with much activity, it is evident that such a rupture can only be kept up by the pressure of a very strong truss, which, contracting round the body so as to depress the pad at one of its ends through the depth of two or more trusses of the soft parts before it can act upon the abdominal ring, must produce violent pain and excoriation on all that part of the body on which it lies; to obviate this inconvenience, the following improvement is always effectual.

“Instead of a simple circular spring, with the pad fixed immovably to it, which is the mode of constructing the common truss, the pad of the improved truss is connected with the circular spring by means of another spring, which, at the same time that the circular spring keeps it exactly in its proper situation, increases the power of motion and compression in the pad so much that it produces a firm, equal, and gentle pressure upon the part, in whatever situation the patient may place himself: and as almost half the pressure that is required to keep up any rupture may thus be produced by the pad only, the circular spring need not be more than half so strong as in a truss of the same strength of the common construction; by this means so much of the inconvenience as is produced by the circular spring of the common truss may be avoided.” Mr. S. first published the description of this truss in 1781, and has invariably used it in bad cases ever since, and always with complete success.

“When a proper truss is provided, it is necessary that the patient should be well instructed in the use of it, and his medical attendant should superintend the use of it till the patient is able to manage it himself. The rupture should be completely reduced, and the truss so applied that the lower edge of the pad may lie even with the superior edge of the os pubis; if it is placed higher than this, the rupture will descend; if it is placed lower, the soft parts will be compressed between the truss and the pubis, and much unnecessary pain occasioned; the spermatic vessels will become inflamed, and very painful sensations extend to the testes, which in some cases have been permanently affected in consequence of such treatment.

“If, upon careful inspection, the truss seems to fit accurately, we should not be discouraged if the rupture should descend some time after the bandage is put on: for it frequently will happen, when a patient has not worn a truss, that on its first application the rupture will descend in a short time; it must then be returned, and the truss replaced: if, upon a repetition of this for some days, however, the rupture is not perfectly retained, it may safely be concluded that the truss is deficient in strength, and a stronger must be provided.

“If on application of the truss it should excoriate the parts it lies upon, that effect may be produced by two distinct causes: peculiar delicacy of the parts; or friction from the truss; the first may be remedied by topical applications, the latter may be prevented by interposing some soft substance, such as fine flannel, or linen folded

together to some thickness and laid between the body and the truss; by this means the friction from the truss will be exerted upon the interposed substance, and the body left perfectly at ease.

“The patient should be cautioned never to be without his truss while out of his bed; and even in bed there are many cases where a truss should be worn: a patient who is troubled with a cough should never be without his truss, as coughing in bed is as likely to force down the rupture, as in any other situation; and those who, from youth, or any other circumstance, are likely to get perfectly cured, will increase the probability of a perfect cure by keeping the truss constantly on.

“Two opinions have of late years prevailed respecting the application of trusses; the first is, that the truss should be as easy as possible, consistently with the patient's safety; the second, that the truss should be as strong as can be borne, because its compression may produce a certain degree of inflammation that will tend to reunite the parts, and thus effect a cure: in this mode of proceeding the pain is certain, the probability of injuring the spermatic vessels, and even the testes, great, and the benefits, if any, that may result from the practice, very uncertain; but in acting upon the former plan, the patient is kept in perfect safety, and at ease; he is certain of deriving every benefit that can be obtained from the use of the truss, with as much ease as the nature of the case will admit, and therefore this seems to be the plan that should be generally adopted in practice.”

SECT. IV. Of HERNIA CONGENITA.

The testes in the foetus are, till about the time of delivery, lodged in the cavity of the abdomen. When they descend into the scrotum, they push before them a portion of the peritonæum, which afterwards forms the vaginal coat. The passages by which they descend are soon shut up; but sometimes the contrary happens, and then a portion of some of the abdominal viscera passing down, forms that species of hernia to which new-born infants are liable, termed by Haller the *hernia congenita*. The testicle and protruded intestine being here in contact with one another, the tunica vaginalis testis forms the hernial sac.

It has been affirmed by some of the latest writers, that *hernia congenita* cannot be distinguished from that contained in the common hernial sac; and that though there was a distinction, it could be of no material use in practice. But Dr. Monro observes, that a *hernia congenita* may be distinguished in an adult by an evident external mark; which is, that the bowels push down between the sac and the forepart and sides of the testicle, so as often in a great measure to conceal it; whereas, in the common hernia, every part of the

testicle can be felt distinctly: and that it is of material use to make the distinction; because in whatever manner we operate in hernia congenita, unless we take the utmost care to exclude the air, there will be a more violent inflammation, and greater distress than in common cases, because the testicle will partake of the inflammation.

In the *treatment* of ruptures of the *congenital kind*, little difference occurs from the management of the common scrotal hernia; only a truss ought never to be applied to infants, unless the testicle can be felt in the scrotum, after the contents of the hernia have been reduced; as it would entirely prevent the descent of the testicle, which yet remains in the abdomen. If any operation has been performed, the testicle should, immediately after the bowels are reduced, be covered with the vaginal coat, and at each dressing care should be taken that the air be excluded. In every other respect the treatment of congenital hernia is the same with that of hernia in general.

SECT. V. Of FEMORAL or CRURAL HERNIA.

The seat of this species of hernia is upon the upper and forepart of the thigh; the protruded bowels passing out at the same opening through which the large blood-vessels of the thigh are transmitted from the abdomen, and of consequence under that part of the tendon at the upper end of the abdomen known by the name of *Poupart's* or *Fallopian's ligament*. Sometimes the bowels which protrude are situated immediately over the femoral vessels, sometimes on the outside of these, but more frequently they lie upon their inner side. The disease is more frequent in women than in men, on account of the width of the female pelvis, and of consequence the length and laxity of the ligament. The femoral hernia is more in danger of being confounded with inguinal hernia than with any other; the tumor, however, is deeper, and the ring of the abdominal muscles, which lies entirely above the tumor in femoral hernia, completely surrounds the parts in that of the inguinal kind.

In the *treatment of femoral hernia*, when symptoms of strangulation occur, we must use all the remedies commonly practised for herniæ in general; only that here, in attempting to reduce the parts by the hand, the pressure should be made directly upwards. An incision of sufficient length is to be made through the integuments, so as to allow that part of the tendon which forms the stricture to be laid fairly in view: and after dividing the integuments, we are cautiously to cut the fascia lata of the thigh, and separate any glands which may come in the way till the stricture and part of the sac distinctly appear. The stricture is then to be divided, by cutting fibre after fibre successively. The spermatic vessels in the male, or round ligament in the uterus in the female, may be avoided by

cutting in a direction towards the umbilicus, carefully dividing the tendon transversely. Some authors, from a sense of the danger attending this part of the operation, have recommended merely to dilate the passage, instead of dividing the tendon; but in such a situation, to attempt a further dilatation without the assistance of the knife, would probably be seldom attended with any advantage. After the parts are reduced, the wound is to be dressed as directed in the treatment of hernia in general: a piece of thin leather spread with some adhesive plaster retains the dressings better, and with much more ease, than any other bandage.

The following case of strangulated *crural hernia*, where the operation succeeded after the obstruction had continued six days, is published in the Medical and Physical Journal, by Mr. Borrett, surgeon, of Great Yarmouth:

"I was requested," says he, "to attend Mrs. Warner, of this place, in consultation with four medical gentlemen. We found her with a *crural hernia* incarcerated, vomiting a quantity of fecal matter, with hiccough, cold extremities, and a quick, small, but irregular pulse.

"The intestine had already been strangulated five days, during which time the usual treatment recommended for reduction was steadily but unsuccessfully pursued. The tumor was about the size of a pullet's egg; and in consequence of its not being tender to the touch, reduction was attempted, but without success. The operation appeared the only chance to save her life, which was urged to her, but she would not consent. The cold applications were continued, pills composed of Ext. Colocynth. comp. and Calomel, and a grain of opium for a dose, were prescribed, and enemata of tobacco. At ten o'clock the following morning we visited our patient. The enemata had acted powerfully on the system, but produced no evacuation by stool; the vomiting of feces continued. Being apprehensive that she could live very few hours, she begged the operation might be performed, to which we agreed, as the only means of saving her life; although we now much doubted its success, as her pulse was become very feeble, and she had the *facies hippocratica* strongly marked.

"Every necessary preparation being made, I proceeded to the operation; exposed the fascia, ligamentum Poupartii, the hernial sac, and its contents; I then divided the ligamentum Poupartii, and afterwards, with some difficulty, passed Pott's bistoury, and divided the stricture (which was considerable) at the mouth of the sac. The rupture was Enterocoele, and the portion of intestine included, which was the size of a nutmeg, appeared of a livid colour: pressure upon the intestine gave pain, and excited retchings, which encouraged me to hope it had still sufficient life to have its action reproduced.

The sac had descended for fourteen years, and more than once suffered inflammation; it was thickened in consequence, and resembled a cod's sound; and completely adhered to the surrounding adipose membrane; a great portion of it was dissected out. The wound was drawn together by sutures; light dressings were applied, and secured by a T bandage. Small opiates were ordered every four hours, to allay the irritability of the stomach, and support her strength; and broth clysters, after some days, restored the natural peristaltic motion of the intestines. Mrs. Warner was the mother of thirteen children, and at this time in the third month of gestation; she did not miscarry, and is now quite well: she wears a truss. This case, and many others recorded, shew, that the operation for hernia may succeed at almost any period of strangulation, and encourage us never to despair of our patient."

Mr. Borrett's inducement for communicating the above case, arose from Mr. Geoghegan's having, in his "Strictures (noticed in our preceding pages) on the usual Practice in strangulated Hernia," represented the danger of the operation, abstractedly considered, to be imminent, and especially as that gentleman appears to be an advocate for procrastination; from which the danger, in Mr. Borrett's opinion, wholly arises.

"Whoever," continues Mr. Borrett, "will consult Pott on Ruptures, will see the most judicious treatment and decided reasons for his mode of conduct, respecting the operation. 'There is no circumstance,' says he, 'attending ruptures with stricture, in which more variety is found than in the time which they will safely admit to be spent in their reduction; some have been successfully replaced at the end of eight or ten days, others have proved fatal in one.' The attention of the medical world ought, therefore, to be directed to the *time* when the operation, in different cases of strangulated hernia, should be performed: from delay every thing is to be dreaded; and many valuable lives are daily lost, that would indisputably be saved. The surgeon who has a case of strangulated hernia, ought not to waste the only moments which might secure his patient's life by a *well-timed operation* in applying fomentations and placebos.—(Pott, p. 82, 83. vol. ii.) There is not, in the practice of surgery, a point which requires more judgment, firmness, or delicacy, than to determine the precise time beyond which this operation should not be deferred, and for a surgeon to conduct himself so as to induce a patient to submit to it early enough for his preservation. The two principal circumstances which have most contributed to the infrequency of performing this operation are, a dread of great hazard from the operation itself, considered abstractedly, and a fear of bringing a disgrace upon it by having performed it too late; '*ne occidiss. nisi servasset videretur.*' The first then is vastly greater than it ought to be, and is most frequently the cause of the latter; so that if the one can justly be lessened, the other will not be likely to happen. Few experienced

men then can doubt the propriety of operating early in strangulated hernia; after the most approved treatment has been regularly and consistently tried without effect, and a judicious application of the taxis has been unsuccessful, why should the life of the patient be risked by further delay of the operation, in which, comparatively, there is no hazard, if it be judiciously performed? I am justified in this positive assertion if any inference may be drawn from six cases, four of which (besides the present) recovered. From one of these patients more than a pound of diseased omentum was cut off, without hæmorrhage or any other disagreeable symptom. Of the other two, one died from the operation being too long delayed; and the failure of the other depended on the stricture at the mouth of the sac not having been completely divided; a point in the operation which requires great care and certainty.

“ In the operation for Crural Hernia, the epigastric artery and spermatic chord in the male, and ligamentum rotundum in the female, are parts lying in the way of the knife, and particularly increase the difficulty and hazard of the success of this operation. Benjamin Bell, in his account of the operation in Femoral Hernia, discourages us by saying, ‘ Whether the incision be carried directly upwards, or even obliquely outwards or inwards, these parts must generally be divided.’ Pott is not more clear and determined, and recommends, after the hernial sac, intestine, and ligamentum Poupartii, &c. are exposed, to endeavour the return of the intestine before the division of the ligament. Supposing every medical man perfectly acquainted with the anatomy of the parts concerned in Crural Hernia, I shall proceed directly to a description of the operation.

“ The patient being placed in a proper situation, the incision is to be begun above the tumor, laying bare the fascia and the sac. You then see the ligamentum Poupartii, binding down the sac, which is to be divided; but as you will have the epigastric artery, and spermatic vessels in man, crossing each other *immediately over* the tumor, and in woman the epigastric artery and ligamentum rotundum, much care must be taken.—The best mode is, to make a small incision between the fibres of the external oblique muscle, about *half an inch* above the ligament, and a director being passed *carefully and immediately under the ligament, and over the artery* (which adheres to the ligament by cellular substance), to cut into the groove of the director. If, when this is done, you should find the stricture at the mouth of the sac, it must be divided *inwards* to the pubes, inclining Pott’s knife rather obliquely downwards. In this mode you will avoid the artery, chord, and round ligament.”

No clear account of the operation for the *crural hernia* having been given by authors, Mr. Borrett’s instructions on that head cannot but be highly acceptable to the reader.

SECT. VI. *Of OTHER SPECIES of HERNIA.*

Exomphalos.—In the exomphalos or umbilical hernia the parts protruded pass out at the umbilicus, and are commonly the intestines, or omentum, or both; sometimes part of the stomach, the liver, and even the spleen, have been found in the sac. Here, as in other ruptures, the peritonæum forms the sac, and in recent cases it is generally very evident; but by the size of its contents, or a long continuance of the disorder, it sometimes becomes so connected with the surrounding parts, that by many its existence has been doubted, and sometimes the swelling has increased to such a degree as to burst even the skin itself. The disease occurs most frequently in infancy, soon after birth. In the adult state, corpulent people are more subject to it than those of a contrary habit; and pregnant women are particularly subject to it, on account of the size of the uterus. The diagnosis in this disease is readily made, as the disorder can scarcely be confounded with any other. If the disease be attended to in due time, a bandage properly fitted will generally effect a cure; and in such swellings as occur in pregnancy, delivery will commonly remove the disorder; but even in cases of pregnant women, a bandage early applied and properly used will give considerable relief, till a cure can be applied by delivery. In this disease the omentum is more frequently pushed out than any other viscus; hence umbilical herniæ in general are not productive of such bad symptoms as usually occur in the other kinds of rupture. When, however, the intestines protrude, the usual symptoms of a strangulated hernia are apt to be induced; and when the means usually employed for returning the gut into the abdomen do not succeed, a cure it is evident must depend entirely on a thorough removal of the stricture. In performing this operation, an incision through the integuments is the first step to be taken, so as to expose the stricture of the tendon and the neck of the sac. The stricture is to be removed in the manner already described; and as the tendon completely surrounds the neck of the sac, the stricture may be cut wherever it can be most readily dilated. A radical cure similar to that for the other species has been proposed, but with as little probability of success.

Ventral hernia.—The ventral rupture is a protrusion of some of the bowels through the interstices of the abdominal muscles, and is most frequently observed in some of the parts most contiguous to the linea alba. The treatment of this species of disease is exactly the same with that of exomphalos.

The following case of a fatal hernia of some of the abdominal viscera strangulated in the cavity of the thorax, by Dr. Clarke, appears in the Transactions of the Society in London for Medical and Chirurgical Improvement.

The patient was a man of a middle stature, about forty years of age. Till within the last two years he was generally healthy; but from his earliest years he had been occasionally liable to head-achs, attended with nausea. They seldom lasted more than twelve hours, and were generally relieved by vomiting.

About the end of December, 1793, he fell from a height, by which two of his ribs were fractured. The accident was followed by no unusual symptoms, and he recovered from it very well.

After the fracture of his ribs, his head-achs became more frequent. He often felt in the region of the stomach, a degree of prominence or fulness, about the size of the palm of his hand, which gave him pain on the slightest pressure, so that he was forced to wear his waistcoat open, or very loosely buttoned.

Through his whole life, but especially since the fracture of his ribs, he had been sometimes costive for several days. On such occasions, the tenderness and uneasiness of the epigastric region was much increased. The constipation commonly went off spontaneously, or yielded to gentle laxative medicines.

He had been occasionally subject to violent pain in his left shoulder, particularly after eating a hearty meal; but never had any symptom of jaundice.

During the last twelvemonth, he had eaten his meals more irregularly than he had been accustomed to do before; to which he attributed an increase of the uneasiness of his stomach.

"About two days before I saw him," says Dr. Clarke, "he had taken more exercise than usual without any refreshment; and returning home much fatigued, he complained of a sense of coldness. As it was late he missed his dinner, but drank tea and ate heartily of roast and butter. At supper, he made a plentiful meal of cold roast beef and porter.

"When he arose next morning, feeling a weight at the pit of the stomach, he took six drams of a saline purgative, without any effect. At two o'clock he made a hearty meal of boiled beef, which he swallowed hastily in large pieces.—In half an hour he began to complain of pain in his bowels, and went to bed, where the pain increasing, he drank some brandy and water, which he soon rejected by vomiting, along with the greatest part of his dinner as he had swallowed it. The disposition to vomit not subsiding, he sent for Mr. Williams, of Vere-street, his apothecary, who visited him about five o'clock in the afternoon of Friday, December 19th.—He then complained of pain resembling a severe colic.—His pulse was seventy in a minute, not full, nor tense: there was no remarkable heat on the skin, nor thirst; nor was there any tension of the belly.

"Under the care of Mr. Williams he was bled, went into the warm bath, and took several purgative medicines. He was afterwards attended by Dr. Milman, Dr. Pitcairn, and myself.—His belly was also fomented, and stimulating clysters were injected without

producing any evacuation of *æces*.—This treatment was pursued between the 19th and 22d of December.

“ At this time vomiting occurred at intervals; the pulse was not increased in frequency, but it had become rather fuller, and the patient complained of some tenderness and pain of the belly, when pressed, which he had not done before. He hiccupped frequently, but this symptom was so little urgent that it could be allayed by taking a little warm tea.

23d.—“ A clyster, made of an infusion of tobacco, produced no other effect than languor, and fainting, with nausea.

“ By this time, the belly was becoming more full and tense, with an increase of pain upon pressure, especially on the right side. A blister was now applied to his belly.

“ 24th, No favourable alteration had taken place. During the whole course of the disease, the patient had not been sensible of any motion in any part of the intestinal canal: the pulse had never been more frequent than ninety in a minute. The pain was not commensurate with the tension of the belly; and the symptoms altogether were milder than such as commonly occur in cases of long-continued inflammation of the intestines with constipation.

“ As none of the medicines had produced any good effect, electricity was applied to the belly twice on this day, with the intention of stimulating the intestines supposed to be torpid.

“ 25th.—Draughts composed of salt of hartshorn with the camphorated mixture were given with the same view, but were quickly rejected by vomiting.—At this time, the patient complained of thirst, and expressed a great inclination for brandy and water, which for the same reason was allowed, and he drank it plentifully. Some was also injected into the rectum.

“ During the last two or three days, though he had occasional pain and vomiting, he suffered more from hiccup and a sense of fulness, as if he should burst, or as if (to use his own expression) the contents of his belly were now beginning to rise into his throat. His breathing at this time became shorter, and more difficult; and this increased towards the evening of this day, when his hands became cold: he complained of much pain in the region of his heart; and early in the morning of Friday, December 26th (having retained his understanding to the last), he died.”

The following were the appearances on dissection.

“ Externally the abdomen was very much swollen and tight to the feeling. Upon cutting into the cavity of the abdomen, the stomach and all the intestines appeared greatly distended with fluid, and shewed marks of inflammation, especially at the limits of their mutual contact.

“ The intestines were glued together with coagulating lymph. The head of the colon adhered very firmly, by recent inflammation, to the surface of the neighbouring peritonæum. This part of the

gut was enormously distended and inflamed; and that portion which lay in contact with the parietes of the abdomen, was of a very dark colour, as if it had been beginning to mortify.

“ From the head of the colon, the large intestines were found filled with fluid contents, and bearing marks of inflammation on their outer surface.

“ On the left side of the transverse arch of the colon, the intestine appeared as if dragged up towards the diaphragm, above, and a little more forward than the spleen.—Here its course was rendered obscure by the general fulness of the intestines, which entirely intercepted our view.

“ The stomach, the whole of the small, and part of the great, intestines were taken away, that we might better examine what remained.—We then found a part of the colon forced through an aperture in the diaphragm into the cavity of the thorax. This aperture in the diaphragm was on the left side, about three inches from the ribs, and situated more forwards than the natural opening for the passage of the œsophagus.

“ From the connection of the colon with the epiploon, a portion of the latter was carried up along with it, as was also a part of the outer edge of the left lobe of the liver. The whole of this lobe was altered from its natural appearance, being very thin and flabby. This viscus was altogether uncommonly small; but in other respects it appeared healthy.

“ The great intestines, below the strangulation, were contracted in their whole course to the anus, contained no fæces, and had a perfectly natural appearance. All the other viscera of the abdomen were found.

“ On exposing the left cavity of the thorax, we found the lungs so much collapsed, as not to occupy more than a third part of the cavity; but in other respects, they were in a natural state.

“ We next examined the viscera, which had been forced through the perforation in the diaphragm.—The portion of gut was covered anteriorly with a surface of the epiploon. This, as well as the intestine itself, was in a high degree of inflammation. The intestine was completely full of fluid, so as to fill up the aperture of the diaphragm, and effectually to prevent all passage into, or out of it.

“ Another circumstance also presented itself. The diaphragm near the intestine so protruded, was firmly connected by an old adhesion, about an inch in length, to the bony part of two ribs, exactly at that place where they had been formerly fractured. An irregular callus projected inwards, by a kind of spinous process; and to this the diaphragm was attached.

“ Upon the cellular substance, so connecting the diaphragm to the ribs, were marks of recent inflammation; which extended over a small surface of the surrounding pleura: but it may be remarked,

that the investing membrane of the thorax had in no other part been affected by the disease."

After observing that no disease was found either in the right side of the thorax, the heart, or its pericardium, Dr. Clarke makes the following observations on the case.

"Similar perforations of the diaphragm," says he, "with an intrusion of more or less of the abdominal viscera into the cavity of the thorax, have been sometimes found in children; but the patients have been soon destroyed after birth, by difficulty of respiration, from the lungs not being capable under such circumstances of being expanded. In these instances, the abdominal viscera have been sometimes found in the right, and sometimes in the left side of the chest.

"My enquiries have not furnished me with any other instances of strangulation, or even of perforation through the diaphragm.

"Several things in the history of this case, compared with the appearances after death, induce me to believe that the viscera had been for a long time in this unusual situation. The diminished size of the lung of the left side, his occasional costiveness for many years, the pain which he always felt from any pressure on his belly, and the pain in his shoulder, all favour this opinion. The liver too was smaller and softer than is natural; and such changes could not have taken place on a sudden.

"Whilst he lived regularly as to his meals, and the peristaltic motion was not disturbed, this unusual state of the viscera produced no remarkable symptoms; but if at any time he ate a larger meal than ordinary, he was subject to costiveness, and to a pain which he always referred to the epigastric region. At such times, it is probable that a larger quantity of faeces than usual was forced into the protruded gut, and against the perforation through the diaphragm, by which their passage was for a time impeded.

"This cause appears to have laid the foundation of his death. He had eaten voraciously, and had accelerated the passage of the food by a purgative; by which means a strangulation was brought on, so obstinate as to resist all the medicines employed for its removal.

"It is further to be observed, that (considering the nature of the disease) the symptoms were more mild than is usual in cases of fatal constipation from strangulated hernia, intussusception, &c.---and that, although the portion of intestine and epiploon found in the cavity of the thorax, and a large part of the contents of the abdomen, were in a high degree of inflammation, yet the cavity of the thorax partook but in a slight degree of the disease."

After Dr. Clarke's paper was read, he found that Ambrosé Paré had described a case in which the patient survived a penetrating wound into the chest and through the diaphragm, for eight months, during which time he suffered great debility of the stomach, and pains, like colic, especially in the evening. After one of these at-

acks he died, and his body was opened, when a large part of the colon was found to have passed through the wounded diaphragm into the thorax. In that case, the disease was evidently occasioned by the wound; whilst in that just related, there is every reason to believe that the perforation in the diaphragm had existed through the whole of the patient's life.

Dr. Clarke's case is illustrated by a drawing of the parts, for which we refer to the work itself.

Cystic hernia.—Hernia of the bladder of urine, though less frequent than that of the omentum or intestines, is not very uncommon. The situation in which it occurs is in the groin, through the abdominal ring, in the fore part of the thigh, under Poupart's ligament, so as to form inguinal or crural hernia. Instances have likewise occurred of the bladder being pushed into the perinæum. Sometimes it occurs by itself, without any complication; at other times it is accompanied with intestines and omentum, both in inguinal and femoral herniæ: when complicated with bubonocoele, the protruded part of the bladder is situated between the intestine and spermatic cord.

The usual symptoms are a tumor attended with fluctuation, either in the groin, in the fore part of the thigh, or perinæum, which generally subsides when the patient voids urine. When the swelling is large, before water can be made with freedom, it is commonly necessary to have recourse to pressure, at the same time that the tumor, when in the groin or thigh, is as much elevated as possible; but when the swelling is small, and especially when no stricture is as yet produced, the patient generally makes water with great ease, and without any assistance from external pressure. When the disease occurs without any complication, it is commonly owing to a suppression of urine. In the diagnosis, care ought to be taken not to mistake it for a hydrocoele. In recent cases, the part protruding may in general be easily reduced, especially if we attend to the suppression of urine, which probably gave rise to the disease. A proper truss ought afterwards to be worn for a considerable time. When the disease has been of long standing, adhesion takes place between the bladder and cellular substance of the scrotum. In this case, therefore, as long as no symptoms occur to render the operation necessary, a suspensory bandage so fitted as effectually to support the protruded parts is the only probable means of relief.

Hernia vaginalis.—Sometimes the bladder, owing to a suppression of urine, at other times part of the intestines, have been found to protrude through the vagina. In the former case, a fluctuation of water is perceptible to the touch.

The reduction is made by laying the patient on her back with her joints somewhat raised, and pressing with the fore finger from the vagina. Descents may in future be generally prevented, by evacuating the urine often, and by the use of a pessary introduced into

the vagina. Nearly the same means are employed in reducing the intestine when it is found to protrude.

CHAP. XXIV. OF HYDROCELE.

EVERY tumor formed by a collection of water might with propriety be named *hydrocele*, but the chirurgical acceptation of the term implies a watery swelling situated in the scrotum or spermatic cord. Hydrocele is either anasarcaous or encysted. In the former, the serum is chiefly diffused in the cellular substance: in the latter, the water is collected in a distinct bag. The scrotum with its contents are liable to both varieties of the disease; so is the spermatic cord with its coverings.

SECT. I. ANASARCAOUS HYDROCELE of the SCROTUM.

As soon as water has collected in any considerable quantity in the scrotum, a soft, inelastic, colourless tumor is observed over the whole of it; impressions are easily received and obtained for some time; the skin at first preserves its natural appearance, and the rugæ of the scrotum are not much altered; but as the swelling advances, they gradually disappear, and are at last totally obliterated. The swelling, from being at first soft, and of a consistence similar to dough, by degrees turns more firm, and the skin at last acquires an unnatural white shining appearance. The tumor at length becomes large; and though originally confined to the scrotum, it at last spreads up the groin. The penis likewise becomes affected, and often so swelled and distorted as to excite much inconvenience and distress; and although the scrotum is composed of parts which readily admit of dilatation, the tumor sometimes becomes so enormous that it bursts from one end to the other.

In the *surgical treatment* of this disease, punctures made with the point of a lancet are most advisable; as large scarifications, in anasarcaous habits, are sometimes apt to produce inflammation and mortification; while simple punctures readily heal, and can be renewed with very little pain as frequently as may be necessary: and besides, punctures are equally useful with the incisions; for as the cells of the scrotum communicate freely, if the punctures be made fairly through the skin, the water drains off very readily, though not so soon as by scarification. Previous to the operation, besmearing the part with some tough ointment of an innocent nature, and afterwards keeping it as dry as possible by a frequent renewal of dry soft linen cloths, in order to imbibed the moisture; is here a necessary piece of attention. The want of this seems to be the cause of much of the mischief which frequently ensues from operations of this kind. When scarifications or punctures go wrong by begin-

ning to inflame and turn painful, &c. a cold solution of *saccharum saturni*, applied upon soft linen, proves most effectual in putting a stop to the further progress of the inflammation, and affords most immediate relief to the patient in the present distress. Lime-water, employed in the same manner, proves also a very useful application. When, however, the disorder proceeds to gain ground by a real mortification coming on, we should immediately have recourse to bark and other medicines usually employed in such affections.

Although the anasaruous hydrocele, for the most part, depends upon a general dropsical tendency, some instances occur of a *local cause* producing a mere local dropsy of the scrotum. Thus, it has been known to happen from swellings in the groin and in the abdomen obstructing the passage of the lymphatics. When this is the case, if tumors producing such obstructions can be extirpated, no other means will afford such effectual relief; but when they are so deeply seated as to render any attempt for removing them improper, the practice we have already pointed out of making punctures in the most depending part of the tumor must be employed with a view to palliate such symptoms as occur. It sometimes happens in suppression of urine, whether arising from strictures in the urethra or from stones impacted in it, that the urethra bursts, and the urine in this manner getting access to the cellular texture of the scrotum, an anasaruous swelling rises immediately over the whole of it; nor does it commonly diminish till the cause by which it is produced is removed. In order to prevent the formation of sinuses, which in such circumstances will otherwise be apt to occur, an incision should be made into the tumor, and carried to such a depth as is sufficient for reaching the wound in the urethra. In this manner a free vent will not only be given to the urine already diffused, but the further collection of it may probably be prevented. If a stone impacted in the urethra be found to be the cause of effusion, it should be cut out; and if the obstruction be produced by strictures in the urethra, they must be removed by a proper use of bougies. The cause being thus removed, if the habit of body of the patient is good, and untainted with any venereal or other general affection, by dressing the sore properly with soft easy applications, the opening into the urethra will probably heal, and a complete cure will in this manner be obtained. But when these ailments are complicated with any general affection, particularly with old venereal complaints, it frequently happens that neither mercury nor any other medicine has much influence in removing them.

SECT. II. HYDROCELE of the TUNICA VAGINALIS TESTIS.

In the healthy state of the body, a small quantity of aqueous fluid is exhaled for lubricating the surface of the testicle, the superfluous

part of which is absorbed by vessels appointed for that purpose. When the secretion of this fluid is either morbidly increased, or its absorption diminished, a preternatural collection of water is formed in the cavity of the vaginal coat, and hydrocele of the vaginal coat produced.

Symptoms.] The symptoms are, a fullness at first observed about the inferior parts of the testicle, and most remarkable when the patient is erect, becoming gradually more tense as the disease advances: the tumor by degrees changing from the globular to the pyramidical form; no degree of pressure making the swelling disappear at any period of the disease. In the early part of the disease therefore, if it be not combined with hernia, or with a hydrocele of the cord, the spermatic process may be distinctly felt, because the swelling does not extend beyond the scrotum. In its more advanced state, it cannot be distinguished: the weight of the tumor now drags the skin of the neighbouring parts so much as to cause the penis almost to disappear; and in this state of the disease the testicle cannot be felt without much difficulty. On a minute examination, a hardness is always to be felt along that part of the scrotum where the testicle is situated; and at this point pressure excites some uneasiness. Fluctuation of a fluid may in general be distinguished through the whole course of the disease. In late stages, however, the appearance of a fluid is not very evident.

The transparency of the tumor has been generally supposed to be the principal criterion of this species of the disorder; but this must depend upon the nature of the contents, or thickness of the sac; so that, though the transparency of the tumor is a certain sign of the existence of water, its opacity cannot upon any account be considered as an indication of its absence. Through the whole course of the disease the tumor is not attended with pain, but some uneasiness is commonly felt in the back by the weight of the swelling of the spermatic cord. This is more particularly the case when a suspensory bandage is not used.

Treatment.] In the radical cure of hydrocele, in whatever way it is attempted, some degree of fever and inflammation will take place. Under the circumstances mentioned in the prognosis, the operation, if properly performed, is generally attended with the most complete success. But if the patient be very old, infirm, and diseased, an operation may be attended with such a degree of inflammation, and consequent suppuration, as to be in danger of destroying a constitution already greatly impaired, and therefore ought not to be performed.

Various methods have been proposed for the cure of hydrocele, all of which may be reduced to two general heads: such as have in view only a temporary relief, and which is therefore termed the palliative cure; and such as are meant to effect a radical cure. When the tumor has become so large as to be inconvenient from its size,

an evacuation of the water by surgical means becomes necessary. In this case, if the patient either refuses to submit to the operation for a radical cure, or if his state of health render that operation improper, the palliative treatment, or a mere evacuation of the water by puncture, is the only means which can be employed.

Palliative cure.] A lancet-pointed trocar was many years ago recommended for drawing off the water in this manner by the present Dr. Monro; and since that time it has in an improved state (fig. 61, Plate II.) been recommended by Mr. Andree; another (fig. 62) has been proposed by Mr. Bell. With any of these an opening may be made into the tunica vaginalis with safety.

The operator with one hand should grasp the tumor behind, to press the contained fluid to the anterior and under part of it. If a round trocar is to be used, a puncture with a lancet should be made where the trocar is to enter; but where a flat trocar is to be employed, the assistance of the lancet is unnecessary.

As soon as the instrument has pierced the vaginal coat, the filette should be withdrawn, and the canula left in the cyst. The water will now run off; and if the tumor be not uncommonly large, it may be all drawn off at once; but as the sudden discharge of it, by taking off the support, might be in danger of rupturing some of the vessels, it should be discharged by slow degrees. When the whole is evacuated, a piece of adhesive plaster should be immediately applied to the orifice; and a compress of soft linen being laid over the scrotum, the whole should be firmly supported with a suspensory bag or a T bandage. The patient, in this state, being laid in bed, all kind of uneasiness is in a few minutes commonly gone, and he is able to follow his ordinary business without interruption.

Radical cure.] The intention of every means now in use for the radical cure of this species of the disease, is to induce such a degree of inflammation on the parts in which it is seated as may obliterate entirely the cavity of the tunica vaginalis, by making it adhere to the surface of the testicle. The means at present generally employed for effecting a cure are, excision of the tunica vaginalis; the application of caustic; the use of a seton; a simple incision of the sac; and the injection of acrid liquors into the tunica vaginalis, after drawing off the fluid which it contained. The method of cure, by the removal of the vaginal coat, is first to lay open the vaginal coat, and then to cut it away by different snips of a pair of scissors. The sac being removed, the parts are to be dressed and treated in the same manner as in the operation where simple incision is used.

By caustic.] The cure by caustic is attempted in the following manner. The scrotum being shaved, a piece of common paste caustic, properly secured with adhesive plaster, is applied of about a finger's breadth, the whole length of the tumor; and if, on removing the caustic, it has not penetrated into the vaginal coat, an opening is made in it with a scalpel, so as to evacuate the contents, lay bare the

testicle, and admit of proper dressings. But Mr. Elie, one of the latest writers in favour of the method of cure by caustic, says that there is no necessity for such an extensive application of caustic as many have recommended; that an eschar of the size of a shilling is sufficient; that this may be always fully obtained by the application of caustic paste of the size of a sixpence, which is to be laid on the anterior and under part of the scrotum, and to be properly secured by plaster, in order to prevent it from spreading. The caustic commonly produces all its effects in five or six hours, and may then be removed. At this time digestives, or an emollient poultice, must be applied over the scrotum, and the whole suspended with a bandage. Inflammation, Mr. Elie observes, is soon induced over the whole tunica vaginalis; and the febrile symptoms which succeed, he advises to be kept moderate by blood-letting, injections, emollient poultices, and a low regimen. In a few days the eschar of the scrotum separates, and comes away; and in a gradual manner, in the course of four, five, or six weeks, the whole tunica vaginalis adheres, when the wound for the most part soon heals, and a complete cure is obtained.

By seton.] Where it is intended to treat hydrocele by means of a seton, it may be done in the following manner: an opening is made with a scalpel, or the sharp-pointed bistoury, in the superior part of the tumor, large enough to admit with ease a thick cord of common white sewing silk. A director, with an eye at one end, in which the cord is inserted, is introduced at this opening; and its further extremity being carried down to the most depending part of the tumor, an opening is there made, of about half an inch in length, by cutting upon the director with the bistoury, the director being now drawn till a sufficient quantity of silk is left hanging out below, the operation is in this manner finished.

Another very simple method of introducing a seton is by means of a silver canula and perforator, as proposed by Mr. Pott.

By incision.] In the operation for a radical cure by incision, the patient being laid upon a table of convenient height, and properly secured by assistants, with the scrotum lying nearly on the edge of the table, the operator with one hand should grasp the tumor behind, so as to keep it firm and make it somewhat tense anteriorly: with a common round-edged scalpel in the other hand, he should now divide the external integuments by one continued incision from the upper to the under end of the tumor. An opening is next to be made in the vaginal coat with a large lancet, or a sharp-pointed bistoury at the upper end of the first incision. This opening should be made of such a size as freely to receive the finger of the operator, which is to conduct a blunt-pointed bistoury, so as to divide the sac down to its bottom, which is considered as being of advantage, by preventing partial adhesions, and the risk of a return of the disease. The incision being completed, the testicle is now brought fully

into view; and if the tunica vaginalis be found, the dressing may be finished immediately. But if the sac be diseased, it is to be removed, which may be readily accomplished by a scalpel or bistoury.

When the hydrocele, as sometimes happens, affects both sides at the same time, if, when the operation is done on one side, an opening be made into the vaginal coat of the opposite side, at the upper part, through the septum scroti, and the incision carried down to the bottom of the tumor, the cyst can be equally well laid open, the water is completely evacuated, and a return of the disease as much prevented, as when the operation is done in the usual manner, and at different times.

In whichever way the incision is made, if the testicle be found, the wound ought to be quickly dressed; for it is found, that on this much of the success of the operation depends. For if the vaginal coat be merely applied to the testicle, or united by sutures, as some have advised, partial adhesions are apt to take place, before a degree of inflammation is produced over the whole, sufficient for making a complete cure. In this manner cavities are left, which either fill with pus during the cure, and require to be laid open, or they afterwards give rise to collections of water, and thereby occasion a return of the disease. The practice of stuffing the cavity of the scrotum with dressings is also a frequent cause of mischief, by exciting too great a degree of inflammation in the part. But when the dressings are properly managed, symptoms of violence almost never occur. The latest authors advise, that in dressing the parts after the operation, two pieces of lint or old soft linen are to be dipped in oil, or in a liniment of wax and oil, and then, by the help of a probe, are to be inserted into the bottom of the sac on each side of the testicle, leaving a sufficient quantity of the pledgets hanging out of the wound, so as to admit of being easily withdrawn at the first or second dressing. The edges of the wound are next to be dressed with pledgets of cerate, and the ends of the oiled pledgets turned over on each side. Several pieces of soft lint are then to be laid over the wound, and these should be more or less numerous in proportion to the heat of the season. A compress of linen is now to be laid over the whole, and the dressings supported by a T bandage or suspensory bag properly fitted. The patient is then to be carried to bed; an anodyne should be given, especially if there should be much pain; and he ought to be advised to lie as much as possible upon his back for a few days after the operation.

In the third or fourth day after the operation, all the dressings, except those between the testicle and tunica vaginalis, are to be removed; and if this cannot be done readily, as the parts are otherwise apt to become uneasy, a sponge dipped in warm water should be applied. On some occasions, at the first dressing, and always at the second or third, the pledgets inserted between the tunica vaginalis come away; and whenever this happens, they should be renewed. It is also pro-

per to renew them daily for the first fourteen or fifteen days after the operation; not however of the same depth as the first, for during the latter part of the cure they need only to be inserted as far as to prevent the divided edges of the tunica vaginalis from adhering to the testicle, before the adhesive process has taken place in the parts more deeply seated. Particular attention however is necessary to this part of the treatment; for when the disease returns, it has been found to be chiefly owing to the edges of the vaginal coat being allowed to adhere to the testicle, before adhesion had taken place between the deeper seated parts.

A complete adhesion of the two coats of the testicle, the tunica vaginalis, and tunica albuginea, takes place most frequently about the third week after the operation. Previous to this time, inflammation continuing gradually to increase, the tumor becomes larger till it acquires somewhat of the size of a swelled testicle from gonorrhœa; but after this period it gradually subsides, and the sore produced by the incision, and now reduced to a line, heals in some time between the fourth and eighth week, according to the habit of body, age of the patient, and other circumstances.

Having thus given an account of the methods usually employed in the cure of hydrocele, we shall now make a few observations on the *comparative advantages* of the three last. From the testimony of many authors of credit, it is evident, that any of these methods, in most instances, prove effectual; but every practitioner being apt to be prejudiced in favour of a particular method, he generally continues to follow that mode and no other; and finding it commonly succeed, he by degrees persuades himself, that other methods of cure, with which he has not had such opportunities of becoming acquainted, are liable to objections, which those who have practised them do not find to be the case. The result of Mr. B. Bell's observations upon this subject is, that although all the three modes of operating, by caustic, the seton, and simple incision, are perhaps equally capable of producing a radical cure; yet, that of the three, the latter, viz. the mode by the simple incision, is liable to fewest objections, and effects a cure, both with least trouble to the operator and least risk to the patient: and of the other two, the treatment by caustic appears to be the best. He has seen all the three produce troublesome symptoms, such as pain, and tension of the abdomen, inflammation, and fever; but hesitates not to say, that the seton is more frequently productive of these effects than any of the other methods.

Mr. Latta is a decided friend to the cure by incision, which he particularly describes in vol. ii. of his valuable *System of Surgery*, p. 327.

"The following cases," says he, "will evince the propriety of the mode of operating above recommended, and likewise shew that,

not unfrequently, a radical cure may be effected by a simple incision of about an inch and a half in length in the most dependent part of the scrotum, without any lint being put into the cavity of the vaginal coat, but only by a free admission of external air into it.

CASE I. "J. M. aged about fifty-four, had been affected with an hydrocele on the left side of the scrotum for about three years. It had begun on the under part, proceeding gradually upward, and was transparent. The operation was performed by laying him on a table three feet and a half high, and making an incision from the top to the very bottom of the tumor, and even a little backwards, at one stroke of the scalpel. I then made an opening with an abscess lancet into the tumefied vaginal coat, about its middle, large enough to admit the point of the fore-finger of my left-hand. Upon this I introduced the straight probe-pointed knife, and laid open the vaginal coat to the uppermost extremity. Then turning my finger downwards, I with the same knife laid open the tunic to the bottom. The testicle appeared quite sound, and a piece of caddice dipped in fine oil was put into the vaginal coat, as above directed, from one end of the tumor to the other; the sides of the sac were brought together upon this dressing, and the edges of the wound dressed with pledgets of cerate, and the whole covered with caddice, and a small compress of lint, a T bandage being put over all.

"Though the whole of this operation was finished in less than five minutes, and nothing seemed to be amiss in the constitution of the patient, the event nevertheless proved fatal. After being put to bed, he had an anodyne, but slept not a moment all that night. Next day at twelve o'clock his pulse beat fifty-six in a minute, and as he had no complaint, nothing was ordered. Exactly thirty-six hours from the operation, he was attacked with laborious breathing, accompanied with great anxiety, as he said, about his heart, his pulse up to 120, and very feeble. No reason could be assigned for this extraordinary change; but, on making enquiry of the nurse, I found that he had slept none for six days and nights past, owing merely to the terror he was in for the operation, by which he expected nothing less than to be dissected alive. This had been put in his head by some foolish people in the Highlands, from whence he came; I then recollected some expressions made use of by him after the operation was over, which confirmed the accounts of the nurse; that on finding he had got so easily over it, he had appeared quite transported with joy. From the time that I saw him, the anxiety constantly increased; in two hours his pulse, which at first was 120, became so quick, that it seemed to be one continued undulation; and in two hours more he expired. The death of this patient was so unexpected, that I can scarce account for it, otherwise than by the sudden transition from fear to excessive joy, which he was unable to bear.

CASE II. " Mr. J. G. aged sixty, whom I found labouring under a swelling of the right side of the scrotum, so large that not a vestige of the penis was to be seen. The cord was found in its natural state; and he informed me that the swelling began at the bottom of the scrotum, gradually ascending, and increasing both in size and weight till the present time. He being unwilling at that time to undergo the operation for a radical cure, I contented myself with making a puncture in the most depending part of the tumor, by which six pounds of fluid were evacuated; the orifice being covered with a little caddice, and a pledget of simple cerate, the scrotum being supported by a proper suspensory bag. In two days the orifice was well, and the scrotum contracted to near its natural size; but the water soon began to collect again, and in about nine months I was sent for, and found the tumor near half the size of the former, but with this difference, that the swelling was pushed up towards the ring, and gave him much pain as it increased, particularly when he attempted to bend forward in the least. He now consented to submit to an operation. As he was of a robust constitution, and the complaint had been brought on by a bruise on the testicle upon mounting his horse, I determined to purge him freely. I therefore ordered him an electuary of crystals of tartar for two days successively, and on the third performed the operation, by laying the patient across the bed, with his breech exactly to the edge of it, so that his feet rested on the floor. His thighs being thus extended, and held fast by an assistant on each side, I laid hold of the back part of the scrotum with my left hand, grasping it so tight as just to make the skin tense on the opposite side; after which I made an incision, from the upper part of the swelling to the very bottom of the scrotum, with a round-edged scalpel, through the skin. Near the ring, and for two inches lower down, I found the vaginal coat covered only by the skin and the cellular membrane in the usual way; but, below this, to the very bottom of the scrotum, nearly four inches more in length, I found the latter thickened to no less than half an inch before the vaginal coat could be discovered, at the same time that the consistence of it was more solid than even muscular flesh; so that, in this under part, repeated strokes of the scalpel were required to cut through it. An abscess lancet was then introduced into the upper and most prominent part of the swelling, so as to admit the complete introduction of the finger of my left hand. Upon it I next introduced the probe-pointed knife, laying open the vaginal coat upwards to nearly its extremity, and turning it downwards, did the same thing. Here, however, as in the scrotum, I also found the under part of the vaginal coat remarkably thickened; and, as the edges of it stuck out considerably after the retraction of the skin, I dissected away nearly three quarters of an inch in breadth of each side of the thickened part. The testicle being perfectly found, I laid one fold of caddice, dipt in oil, within the vaginal coat

on the side opposite to the testicle, from nearly the upper end to the lowermost part of it, leaving a part of the caddice here, as well as in every other part to which it reached, sticking out of the wound. The sides of the wound were then brought together, and dressed with pledgets of simple cerate; the whole of the wound being afterwards covered with caddice, over which was put a small bonnet of tow, with a compress of linen above it, and the whole secured by a T bandage.

" The patient was now put to bed, and had an anodyne draught, with thirty drops of laudanum. In five days the dressings were removed; but the caddice introduced into the bottom of the sac still remained firm, the scrotum being much swelled and uneasy. A large emollient poultice was applied, and changed twice every twenty-four hours. He was now almost free from every complaint, except what arose from the uneasiness of the wound; and in ten days the scrotum began to suppurate freely, the pain, swelling, and tension daily diminishing, but the caddice still remaining firm towards the bottom. He was now allowed his usual diet, and the poultice was removed, the usual dressings of the wound being continued. The caddice was entirely thrown out in eighteen days from the performance of the operation, the scrotum much reduced in size, and the wound discharging freely. The usual dressings were continued; and, in seven weeks from the operation, the cure was completed, the wound being entirely healed, and the scrotum reduced almost to its natural size; and at this moment is in good health, never having had the smallest return.

CASE III. " A man of thirty-six years of age, complained of a hydrocele of the tunica vaginalis. As he was quite healthy, and the cord in a sound state, the operation was immediately determined upon, without prescribing any thing else than a gentle dose of physic. The operation was performed by making an incision through the skin and cellular substance as above directed, and opening the vaginal coat, near the middle, with a lancet, so that the forefinger of the left hand could be introduced, and thus the vaginal coat laid open, both above and below, to both its extremities, as mentioned in the preceding cases. Caddice dipped in oil was then introduced, as already mentioned, and the lips of the wound brought together with part of the caddice sticking out. The wounds were dressed with straps spread thick with calamine cerate, and the dressing finished and kept on as in former cases; the whole being finished in the space of five minutes.

" The patient being now put to bed, had a draught with thirty drops of laudanum. Two days after the operation, he complained of considerable pain in his scrotum, rising upwards to the belly, and spreading to the small of his back. His pulse full and strong, beating 100 in a minute, the skin rather hot, belly costive, with a slight head-ach, and thirst. Having lost very little or no blood during the

operation, ten ounces were now taken from his arm, a gentle laxative injection given at bed-time, and a large poultice of bread and milk applied to the scrotum, after removing as many of the dressings as would easily come away. Next day (Oct. 17th), the pain shooting to his back, was much relieved since the bleeding and injection, the latter having operated well. The poultice was again applied; and, as he had slept but little last night, an anodyne with thirty drops of laudanum was given at bed-time.

“ 18th, On removing the poultice, all the dressings came away at once, but no purulent discharge followed, though the wound looked tolerably. The pains shooting to the back were considerably relieved, but the scrotum continued much swelled, and very painful. Ten ounces of the infusion of tamarinds, with a double quantity of fenna, were ordered to be taken at twice in the morning, an hour between each dose; the poultice continued.

“ 19th, Physic had operated well, with great relief every way; the wound beginning to discharge pretty copiously; poultice continued.

“ 24th, The dressings within the vaginal coat came away this day, along with a pretty copious discharge of thin matter; the sides of the scrotum were pressed close together, and the edges of the wound drawn towards each other by straps spread with gently adhesive plaster, to within an inch and a half of the under extremity of the opening; the whole being then covered with caddice, and the dressings kept on by a T bandage as directed. He was now allowed animal food every day at dinner, with a bottle of London porter, two glasses of wine, or a little spirits and water, with his usual food for breakfast and dinner. The wound was dressed regularly every day for five weeks; at the end of which time it was completely skinned over, though the scrotum continued more full on that than the other side. This fulness continued for several weeks, but entirely subsided, and since that time he has never had a complaint.

CASE IV. “ M. G. had been affected with an hydrocele of the tunica vaginalis, for which he had been punctured in the summer of 1783, and nearly six pounds of water drawn off from the right side. In three months after the operation, the water began again to collect; and, in March, 1784, he came to Edinburgh with a design to undergo the operation for a radical cure. It was accordingly performed in the usual manner; but on laying open the vaginal coat, as in the preceding cases, all the sides of it were found full of water in cells resembling small hydatids, every one of which I was obliged to lay open by repeated strokes of the scalpel. The testicle was completely found; but, as the vaginal coat had not only been long exposed to the air, but likewise to the pressure of a warm sponge, the sides of it were brought immediately into contact with each other, as well as the testicle. The

edges of the wound being brought immediately into contact, the parts were retained in this position by adhesive plasters, which in a great measure were made to surround, and gently to press the whole of the diseased side of the scrotum together.

" The wound being dressed, and the usual means for keeping on the dressings applied, the patient was put to bed, and an anodyne given at night. He slept tolerably well, and next morning was quite free from pain, the pulse natural, appetite good; but was confined to a low diet for a day or two. In three days from the operation he began to complain of a slight pain, attended with a considerable degree of heat in the affected side. His belly being costive, he was ordered an injection of a pound of warm water; the dressings, which would easily come away, were removed, and a large poultice of the crumb of bread, and a solution of sugar of lead (made with three drachms of the latter, two ounces of vinegar, and thirty of water), applied all over the parts, and ordered to be renewed thrice a-day.

" Fourth day from the operation, pains greatly relieved; the injection had operated well; poultice to be continued; and, in the morning, to have four ounces of the infusion of tamarinds with fenna every hour till it operated.

" 5th, Has had three copious stools. On removing the poultice, the straps came away along with it; the pain of the scrotum gone, though a considerable tension and swelling of the parts still continue; the sides of the wound seem in many places to have coalesced. The straps were applied again, and the poultice over them. Having now no complaint, and his appetite being good, he was allowed to dine upon any kind of solid food he chose, only cautioned against eating much at once; and, having been accustomed to take a glass of wine rather freely after dinner, he was now indulged with four glasses daily at that time.

" 8th, Swelling and tension of the scrotum greatly diminished, without any pain, excepting when roughly handled. Sides of the wound seem to adhere completely, except for about an inch near the bottom of the scrotum; the parts were still supported by the application of the straps; but as the poultice was now become troublesome, it was taken away, and the nurse taught to apply a piece of flannel moistened in the above-mentioned solution, for an hour, three times a-day, covering up the parts during the intervals with caddice, in a proper suspensory.

" 14th, The wound seemed completely healed; and though there was a considerable thickness over the whole surface of the testicle, not the least softness or tendency to fluctuation could be perceived in it. In two weeks more the patient seemed completely cured, and went to the country. It is now nine years since, and he has never had the smallest return.

CASE V. " P. R. aged forty, had for two years been afflicted

with a hydrocele vaginalis. He readily consented to undergo the operation; and, as the spermatic cord was found, and the patient otherwise healthful, it was immediately performed by laying open the vaginal coat in the manner already directed. About two pounds of a coffee-coloured liquor were drawn off, the testicle appearing flaccid, and of a size smaller than natural. A piece of caddice moistened in oil was then introduced as directed, the lips of the wound brought together, and the edges of it dressed with simple cerate.

“ In five days after the operation, the whole of the external dressings were removed. Scrotum much swelled; lips of the wound thick and flabby; dressings inserted within still firm; pulse about 100; belly collive. Had an injection of twelve ounces of warm water, and two ounces of oil. Had also a large emollient poultice applied to the scrotum for two days longer, night and morning, when the whole of the external dressing came away easily. The size of the scrotum from the free discharge of matter that had taken place was much diminished; and the pulse now beat only eighty-six strokes in a minute. Was ordered eight ounces of the simple infusion of tamarinds and fenna to be taken on the eighth morning after the operation, and the wound to be dressed superficially, bringing it together by adhesive straps. On the twelfth day from the operation, wound looking remarkably well; swelling much diminished, as well as the discharge; was dressed as before. But the edges of the wound were now completely brought into contact, from the uppermost part of the incision to the bottom; and the patient was now ordered animal food for dinner, and a glass or two of port wine regularly after it. Having now almost no complaint but weakness, no medicine was further necessary. He was dressed regularly every day as above mentioned. In twenty-six days from the operation's being performed, the edges of the wound adhered accurately; and except a very small degree of fulness, without the least fluctuation, nothing else remained. The parts were ordered to be constantly suspended in a suspensory bag, till the whole of the fulness should be removed. And, although near five years since the operation was performed, he has not at this moment the smallest degree of swelling or uneasiness in the part.

CASE VI. “ A. M. twenty-eight years of age, complained of a large tense and oval swelling on each side of the scrotum, but larger by one-third on the right than on the left side. They had begun about two years before, after considerable fatigue and exposure to cold. Both felt remarkably tense, and gave an evident sensation of fluctuation to the finger when properly applied. As the patient was healthy, I proposed to operate upon both sides at the same time, which was accordingly done on the 10th of this month, by making an incision through the skin and cellular sub-

stance the whole length of the tumor on the right side, and laying open the vaginal coat, as directed, from one end to the other. I then cautiously scratched a hole in the septum scroti, upon which the water flowed out from the left vaginal coat; and I next introduced my finger through the opening, and dilated it to the very bottom; after which a small piece of caddice, about four inches in length, and one in breadth, dipped in oil, was thrust into the left vaginal coat, the inferior end of it being left about half an inch without the lips of the wound at the bottom. The right side was dressed from the bottom with a piece of caddice dipped in oil as directed, and the wound dressed in the usual manner. After the patient was put to bed, he had an anodyne draught, with thirty drops of laudanum, to be repeated at bed-time, if there should be occasion.

" 11th, Has had a good night, with no great pain, but complained of an uncommon heat, with slight tension in the wounded parts. Pulse ninety-six and sharp; skin hot; was bled to ten ounces; had a large watery clyster in the afternoon, and a draught was ordered at night.

" 12th, The injection had operated freely; the blood taken away was covered with a buff-coloured coat; pulse eighty-four, and much softer; heat and tension of the scrotum abated; has had a tolerable night. Injection and draught to be repeated.

" 13th, Slept well, and is now much easier in every respect. As many of the dressings to be removed as will easily come away; and a large emollient poultice to be applied all over the scrotum at bed-time, and renewed in the morning.

" 14th, Dressings came away on removing the poultice; the lips of the wound thick and flabby, without any purulent discharge. Considerable pain and tumor in the scrotum from being much handled. A piece of dry caddice was now put over the wound, and the whole covered with an emollient poultice, to be renewed thrice a-day; a watery clyster had been given every second night since the operation, with an electuary of an ounce and a half of crystals of tartar mixed up with syrup, of which he was to take a tea-spoonful every morning until it operated.

" 18th, Wound discharged freely; swelling and pain considerably abated; the dressings within the scrotum still continuing firm; the poultice was continued; but, as the patient was perfectly free from fever, he was now allowed a little animal food for dinner, with half a bottle of porter daily.

" 22d, Pain and inflammation much lessened; the dressings of the right-side came away this day with great ease, but those of the left still remained firm. Poultice now being removed; sides of the wound kept close together, and its edges dressed with straps spread with simple cerate and caddice as directed, and kept on in the usual manner.

" 26th, A copious discharge of excellent pus; the internal dressing of the left vaginal coat removed to-day with some little difficulty, having contracted an adhesion at the upper end. Its removal was followed by the discharge of about two ounces of thin watery fluid, mixed with a little blood and purulent matter, wound beginning to heal from the upper part as well as from the bottom. Dressed as usual.

" March 4th, Swelling and tension still diminishing; wound discharging freely; about half of the surface of the right testicle exposed to view by reason of the retraction of the lips of the wound. Attempted to bring together the gaping lips by adhesive straps. Dressed as usual.

" 10th, Swelling and tension of the scrotum almost completely gone; wound healed, except at the part where a little portion of the testicle is still bare. Dressed with simple cerate and a little caddice as usual.

" April 1st, Wound nearly cicatrized; pain and swelling entirely gone; the patient has been going about for the two last weeks without the least inconvenience.

CASE VII. " W. R. aged sixty, was afflicted with a swelling of the left side of the scrotum ten inches long, and nearly eight in circumference, which had begun some years before after a fever, and had ascended gradually from the bottom of the scrotum. The tumor was opaque, but by its fluctuation and other signs, evidently shewed itself to be a dropsy of the tunica vaginalis. The size of the tumor, as well as the delicacy of the patient's constitution, in this case, induced me to propose to let off the water by puncture, rather than to perform the operation for a radical cure. This was immediately done by means of a trocar, and about a pound and a half of a greenish fluid drawn off, when the discharge was interrupted, and could not be renewed by the introduction of a probe. The trocar was therefore removed, and a grooved directory introduced through the opening, which was now dilated to the length of an inch and a half, through which a great quantity of hydatids, some of them of a large size, filled with a liquid of the same kind with that which had been evacuated, came out to the amount of about six pounds weight in all. The whole of these, as well as the water, being evacuated, I introduced a piece of caddice within the opening for about two inches and a half in length, leaving nearly about the same length hanging out of the wound. As the puncture had been originally made in the most depending part of the tumor, no water could be retained in the inside of the vaginal coat. The wound was now dressed in the usual manner, the scrotum supported by a T bandage, and the patient put to bed. He had become faintish from the quantity of water discharged, but recovered on being put to bed, and taking a little spirits and water. At night he had an

anodyne draught, and rested well. Next morning he had no complaint; but in four days after began to complain of pain and uneasiness, with a degree of heat in the scrotum. On removing the dressings, the vaginal coat was found considerably indurated throughout its whole length, and painful to the touch, being also much swelled towards the lower part, the integuments moreover being much inflamed, and the internal dressings remaining firm. An emollient poultice was ordered to the scrotum, to be renewed thrice a-day. He was likewise ordered twelve ounces of the infusion of tamarinds and fenna, of which he was to take a wine-glassful every hour in the morning until it operated. By this he had two copious stools, which afforded great relief; the internal dressings were removed, and nearly four ounces of a very high-coloured fluid discharged. A piece of caddice was now again introduced into the vaginal coat through the lips of the wound, and dressed as formerly, with a poultice over it. The discharge of high-coloured fluid mixed with a little matter from the wound, continued to be considerable for ten days; but, during this time, the pain and swelling greatly diminished. The opening, however, was still kept slightly filled with caddice as before, and I determined to keep the wound open as long as any thing was discharged. In eight weeks from the operation, the wound was completely healed up, and the whole of the vaginal coat and scrotum contracted nearly to their natural size and feeling. Throughout this cure it was observable that the vaginal coat contracted from above downwards, being at first very hard and painful upon pressure; but, by degrees, the hardness went off, and it returned gradually to its natural size and softness, going on, in this way, throughout its whole length, till the cure was completed. This patient has continued ever since free from the disease, and is at present in perfect health.

CASE VIII. "A. M. thirty-eight years of age, for a twelve-month had laboured under an hydrocele of the right testicle, succeeding a virulent gonorrhœa. The operation was performed in the usual manner, by completely laying open the vaginal coat. About twelve ounces of fluid were evacuated, and the testicle appeared quite sound. After being exposed to the air for a few minutes, the sides of the vaginal coat were brought together round the testicle, and the edges of the wound made to touch by means of straps of adhesive plaster surrounding the whole scrotum. A large pledget of simple cerate was then laid on, extending from one end of the wound to the other in length, and about three inches in breadth, several folds of linen being put over the whole, and the usual dressings applied. Having had little pain or fatigue from the operation, he was put to bed without any medicine; and, during the whole of the cure, which was completed in eighteen days, he had not the smallest complaint, except on the third and

fourth days from the operation, when he complained of a slight pain striking up to his groin, with an uncommon sensation of heat in the wound; but all these were relieved in two days by a drachm of the compound powder of jalap, which operated freely, and keeping the parts moist with the common solution of sugar of lead. The hardness and pain having gradually decreased, the lips of the wound adhered by the first intention.

CASE IX. "W. L—n, aged forty-eight, was afflicted with an uncommon swelling on the left side of the scrotum, eight inches in length from the one extremity to the other, and about three inches round near the middle, having some resemblance at each end to a cylindric oval. In other respects he was healthy, and said that the complaint came on without any perceptible cause. It was of four years' standing, and the swelling had increased very gradually from below upwards. The operation was performed in the usual way, but no more than five inches of the scrotum and vaginal coat were laid open. The wound was dressed as usual with caddice, and a T bandage. As he complained of much pain from the operation, a draught, with thirty drops of laudanum was given him; notwithstanding which, he had a very restless night, the pain having continued very severe, and increased towards morning. His pulse being at ninety-six and full, I took away ten ounces of blood, and gave him a large watery injection in the afternoon, repeating the draught with ten drops more of laudanum at night.

"January 12th, Pulse quick but soft; pain and tension continue. Applied a large emollient poultice over the whole scrotum, after having removed as many of the dressings as could be easily taken away. Twenty grains of the compound powder of jalap were then given every hour in a glass of barley-water till it operated.

"13th, Pain and fulness somewhat relieved. Took three doses of the powder, which operated fully. Poultice to be continued, and changed three times a-day.

"15th, Dressings totally removed from the surface of the wound; the edges red, and flabby, and swelled, with little or no discharge. The wound was very slightly dressed with charpie, and the poultice ordered to be kept constantly applied. Pulse eighty. He was allowed chicken-broth, with a small part of the chicken for dinner.

"18th, A kindly suppuration began to come on, and a separation to take place of the dressings in the inside of the vaginal coat; the edges of the wound also much less swelled, and looked better. They were dressed with straps spread with simple cerate, and the centre being filled with caddice, dressed in the usual manner.

24th, The whole of the dressings within the vaginal coat were this day removed; and the patient being entirely free from pain

and uneasiness, was allowed to return to his usual diet. The wound was dressed regularly every day, and the sides of it kept together by adhesive straps; but, as near an inch of the testicle was exposed to the air, by reason of the uncommon retraction of the skin, which I was not able to prevent, it was ten weeks before it was wholly cicatrized. While the edges of the scrotum healed in this manner, granulations shot up from the body of the testicle itself; and these, even after the skin had covered them, continued to be very tender, and still remain so, though he has never had the smallest return of the disease."

The last of Mr. Latta's cases we shall present the reader with is,

CASE X. "W. B. aged fifty-two, laboured under a large hydrocele of the right vaginal coat, of a pyramidal shape, and extending nine inches downwards, with the small end uppermost. The swelling was so great, that the penis had totally disappeared; and it was easy to perceive a fluctuation by alternating the pressure with the hands at a considerable distance from one another, though the rays of light did not pass through it. The complaint was of no less than four years' standing, and had originated from an accidental bruise on the right testicle. Little or no swelling was perceived for the first year, except at the under point, but after this it gradually increased, and before the last twelvemonth acquired about half the size it had when I saw him. In all other respects he was healthy, except that at times he had a pain in the small of his back, which, he thought, was occasioned by the excessive weight of the scrotum. The size of the tumor was so great, that I proposed at first only to draw off the water by means of the trocar; I accordingly made an opening in the skin of about half an inch long with a lancet, introducing afterwards the flat trocar through this opening a little below the skin, turning its point, and pushing it cautiously upwards and backwards through the vaginal coat. This was followed by the discharge of a dark-coloured fluid; but, when about one half seemed to be drawn off, it stopped at times almost entirely, though a pretty large probe was frequently introduced. I now suspected, as in a case already mentioned, that the water was contained in hydatids; for which reason the canula was removed along the probe, leaving the end of it within the vaginal coat, to serve as a conductor for a grooved directory, which was introduced, and the opening enlarged by the straight probe-pointed knife to about two inches, through which the whole contents of the sac were immediately discharged, and a considerable number of hydatids of various sizes came away. On examining the testicle with my finger it appeared sound, but felt rather soft and flabby. I introduced a piece of double caddice, exactly broad enough to fill the wound, and dipped in oil. This was put about two inches within the vaginal coat, the other end being left freely hanging out; several folds of cad-

dice being laid over all, and the dressings retained in the usual manner with a bandage. The quantity of water drawn off by this operation was five pounds and a half; and, as the patient had sat in a chair during the whole time, he was now become a little faintish; but being put to bed, and having a glass of wine given him in an horizontal posture, he soon recovered. He had no complaint, excepting that, on the third day after the operation, he had a little degree of pain, heat, and tension, with some fulness and hardness near the ring. For this he had seven drachms of Rochelle salt, dissolved in some weak tea, which operated fully two or three times. The dressings were removed on the fifth day after the operation, a poultice having been previously applied for 24 hours. In this case the caddice introduced within the vaginal coat came also away at this time; and, along with this, nearly four ounces of a high-coloured fluid. The lips of the wound, as well as almost the whole under half of the scrotum, continued swelled and inflamed; and the upper part of the vaginal coat, from the ring downward, felt hard, contracted, and painful, especially when pressed, but not otherwise. A piece of caddice, dipped in oil, was again introduced as formerly; and the wound dressed as before. The dressings were removed in three days, by which time the edges of the wound had begun to suppurate and discharge freely. The same mode of dressing was continued; and, by introducing caddice in this way every second day, the patient was able, in three weeks from the operation, to walk about easily, though the wound was not quite healed up, only much contracted, as well as the whole of the scrotum, a little fulness being all that remained at the under end of the testicle, and downward to the opening. The fore was completely healed in four weeks from the operation, and the patient restored to his full health and spirits, and the size of the scrotum nearly natural.

“I operated,” continues Mr. Latta, “in the same manner on a patient aged sixty, from whom I took six pounds of water, and in twenty-four days the patient was completely cured, without taking a single medicine of any kind; only, as the discharge was very considerable, the matter being high coloured and foetid, throughout the whole of the cure, it was necessary to throw up a weak solution of lead into the wound, of no more than three grains of the salt to an ounce of water.

“In March, 1792, I acted as an assistant to a gentleman in the country, who had under his care a patient sixty-four years of age, afflicted with an hydrocele still larger than any of those I have yet mentioned; and, on my proposal, he immediately agreed to proceed as in the last two cases. Seven pounds of water were evacuated on making an opening about two inches long in the skin of the scrotum, and then piercing the vaginal coat with a lancet, made the opening here of the same extent. The cure went on

without the least difficulty, and was completed in four weeks. The patient got no medicine throughout the whole course of the cure, excepting once or twice a gentle laxative."

Mr. Latta adduces several other circumstantial testimonies in behalf of cure by incision (which indeed was preferred by the late Mr. Hunter), but for these we recommend our readers to consult the work itself.

Cure by injection.] Besides the methods already mentioned, another has been lately revived, viz. the injecting of irritating liquors into the vaginal coat of the testicle. This method is particularly described by a Monsieur Lambert of the last century, and may be of much older date for any thing which is known to the contrary. From some cause or other it seems to have been entirely laid aside till about the middle of the present century, when it was practised by Dr. Monro (afterwards a physician-general in the West Indies), under the sanction of the late Mr. Monro, and favourably received and followed by some of the first surgeons of this place. But in general, though the cure appeared complete, the disease returned.

The preference is usually given to wine, and commonly that is somewhat diluted; but where no pain is excited by the injection, the liquor should be discharged, and a stronger one used. For where no pain takes place, a cure is not to be expected.

The following is the most approved method of performing the operation: the operator should be provided with a flat trocar and canula, and with a bag of *resina elastica*, fitted with a stop-cock and pipe, which ought exactly to suit the canula.

The patient being laid in an horizontal posture, either upon a bed or a table, the water should be drawn entirely off from the tumor by a flat trocar passed into the under and fore part of it. The operator securing the canula with the one hand, is with the other to pass the tube of the injection-bag fairly through it, and with gentle pressure to force in as much of the liquid as may reach the whole surface of the vaginal coat, as well as the whole surface of the testicle. The bag should now be removed, leaving the tube within the canula of the trocar, so that by turning the stop-cork the injection may be retained in the cavity of the tumor. The canula of the trocar ought still to be kept fixed, otherwise it might recede, by which the liquid would insinuate into the cellular substance of the scrotum. The liquor should likewise be brought into contact with every part of the cavity; and after remaining about four, or at the most five, minutes in the sac, it should be entirely discharged through the canula of the trocar, after withdrawing the tube of the elastic bag.

Sometimes intense pain is felt immediately after the liquor is thrown in. When this is the case, it should be discharged as soon

as it has passed over the different parts of the tunica vaginalis. Some recommend a repetition of the same kind of injection immediately after the first has been discharged, and to be retained for the same period, though this is not commonly practised.

The whole of the injection should be completely discharged, after which the scrotum should be covered with a pledget of cerate, a compress being applied over it, and retained with a suspensory bag. The patient ought to be in bed for several days, and support the scrotum in the bandage by means of a small pillow.

Though it is difficult to ascertain the proportion of those who are cured by the method of injection, and though it is to be regretted that hitherto the disease is found to return in a small proportion of those upon whom this operation has been performed; yet, on account of the facility with which it can be done, the comparatively small pain with which it is attended, the quickness of the cure, and chiefly because it does not, in case of a return of the disease, preclude the future operation of incision, it appears a method which, in all probability, will be more and more adopted into practice.

SECT. III. *Of HYDROCELE of the SPERMATIC CORD.*

Anasarca of the spermatic cord sometimes accompanies ascites, and at other times it is found to be confined to the cellular substance in or about the spermatic cord. The causes of this disease may be, obstructions in the lymphatics leading from the part in consequence of scirrhus affections of the abdominal viscera, or the pressure of a truss applied for the cure of hernia.

When the affection is connected with anasarca in other parts, it is then so evident as to require no description. When it is local, it is attended with a colourless tumor in the course of the spermatic cord, soft and inelastic to the touch, and unaccompanied with fluctuation. In an erect position of the body it is of an oblong figure; but when the body is recumbent, it is flatter and somewhat round. Generally it is no longer than that part of the cord which lies in the groin, though sometimes it extends as far as the testicle, and even stretches the scrotum to an uncommon size; an instance of which is related by Mr. Pott, who from a swelling of this kind discharged eleven English pints at once. By pressure a great part of the swelling can always be made to recede into the abdomen. It instantly, however, returns to its former situation on the pressure being withdrawn.

When the tumor is connected with general anasarca of the system, it can only be cured along with the rest of the disease; but when the swelling is local, the remedy is also to be locally applied. An incision is to be made of such a size as may be suffi-

cient for discharging the whole of the water; in the performance of which, attention is necessary to guard against hurting the spermatic vessels. The contents of the tumor being discharged, the fore is to be treated like any other simple wound.

ENCYSTED HYDROCELE of the spermatic cord sometimes begins in the upper, but generally at the lower part of the spermatic cord. On its first appearance it is so small as to give little or no trouble; hence it is seldom particularly attended to till it has acquired a considerable size. By degrees it extends as far as the abdominal muscles, and sometimes reaches to the bottom of the scrotum; and to a person unacquainted with the appearance of the disorder, may be mistaken for a hydrocele of the tunica vaginalis. But here the tumor is always above the testicle, which is distinctly felt below; and even in the advanced state of the disease the testicle is found in the back part of it perfectly unconnected with the swelling; whereas, in the advanced stages of hydrocele in the vaginal coat, although some hardness is discovered where the tunica vaginalis adheres to the testicle, yet when the swelling is great the testicle cannot be distinctly felt. In the encysted hydrocele of the cord, the figure and size of the penis is little altered; whereas, in cases of common hydrocele, the penis frequently disappears almost entirely. In other respects the two diseases are nearly similar. It sometimes happens that the water is contained in two distinct cells. In that case the tumor is somewhat puckered up, or diminished in its diameter. A similar appearance also occurs, when this variety of the disease is connected with hydrocele of the tunica vaginalis, which sometimes takes place.

The only other tumor with which this one may be confounded are, the anasaruous hydrocele of the spermatic cord, and a real hernia. But in neither of these is the fluctuation of a fluid perceptible, and to the touch they are both soft and inelastic; whereas, in this variety of hydrocele, the tumor has a springy feel, and a fluctuation is sensible to the touch; and in both the one and the other the swelling recedes somewhat upon pressure, which it never does here.

From hernia it is chiefly distinguished by the tumor beginning some way down the cord. In hernia the tumor diminishes when the patient is in an horizontal posture, and is considerably affected by coughing and sneezing; but this kind of hydrocele is not altered in size by any such circumstances, nor has it the common symptoms which attend a hernia.

Infants are frequently subject to this disease, as well as to an anasaruous swelling of the cord, and an cedematous tumor of the scrotum. But here the complaint is seldom permanent; for in most instances it readily yields to gentle friction, with any stimulating or astringent application, as a strong solution of sal ammoniac in vinegar, &c. But in adults, the cyst, in every variety of

encysted hydrocele; becomes so firm as not to be affected by external applications; so that when the tumor becomes large, it is necessary to use means for producing either a palliative or radical cure, in the same manner as is done for a hydrocele of the vaginal coat.

SECT. IV. Of HÆMATOCELE SCROTI.

We shall mention in this place the disease called *hæmatocele scroti*; which is occasioned by blood extravasated in the inner substance of the scrotum, in the tunica vaginalis, or in the spermatic cord; but the usual situation is in the tunica vaginalis testis.

Tumors of this kind may be produced by any thing which ruptures the blood-vessels of the part, but they are commonly the consequence of external violence. In the tunica vaginalis this disorder may be produced by the point of a trocar, or of a lancet, in tapping for hydrocele. In such a case, we are commonly informed of the accident by blood being discharged along with the water; though sometimes it does not appear till the whole of the water is evacuated, and then a tumor of a considerable size suddenly takes place. Sometimes it happens where the quantity of water has been so uncommonly great that the sudden discharge of it, by taking away the support which the vessels have been accustomed to receive, has been the cause of their rupture; and it seems certain, that whenever a tumor is produced either in the scrotum, or cord, suddenly after the water of a hydrocele has been evacuated by tapping, that it is entirely owing to an extravasation of blood.

In the spermatic cord, injuries of the same kind will be attended with a similar effect upon the vessels of the sac containing the water. The distinction between blood and water in the substance of the scrotum is readily made by the colour; for where the disease is produced by blood, it forms a real ecchymosis. The tumor feels heavier in the tunica vaginalis when filled with blood, than where it is filled merely with water; the treatment is nearly the same with that of hydrocele. In the commencement of the anasarca or diffused hæmatocele, when produced from slight external violence, the application of stimulating or astringent fluids will sometimes disperse it; but if this prove ineffectual, the tumor is to be laid open, and treated exactly as was directed for hydrocele; only if a ruptured vessel be discovered, it must be secured by ligature. In like manner, all collections of blood either in the vaginal coat or spermatic cord are to be laid open, and treated as in hydrocele. If bleeding vessels appear, they are to be secured. Sometimes, however, these cannot be detected; an oozing takes place which it is difficult to restrain, even by the use of bark, vitriolic acid, and

other means generally employed in such cases. It has been uniformly found, that local remedies prove chiefly useful here, particularly the application of ardent spirits, æther, or tincture of myrrh, to the surface of the fore. Pledgets of soft lint, soaked in one or other of these, not only serve to check the discharge of blood, but in general tend to promote the formation of good matter.

CHAP. XXVI. Of VARICOCELE, CIRCOCELE, SPERMATOCELE, and PNEUMATOCELE.

VARICOCELE is a preternatural distension of the veins of the scrotum, which in this state form a tumor of hard, knotty inequalities, seldom painful, and generally attended with no inconvenience excepting what arises from its bulk. *Circocele* is similar in its nature to the former, but situated in the spermatic cord, extending from the abdominal ring to the superior part of the scrotum, and produced by a varicose state of the spermatic vein. Both of these disorders are occasionally produced by obstruction in the veins; but are most frequently owing to a relaxed state of these vessels; to which we may add, that on account of the smallness of the corresponding artery, they are not sufficiently affected by its influence. The tumor produced by these disorders is sometimes so large as to appear like a hernia or hydrocele; but we distinguish it from these by the touch, for varicose veins are like worms filled with elastic matter. We have another mark upon which we can still more depend: the tumor in the erect posture of the body is much increased, while in the horizontal situation it almost entirely disappears.

Another disorder is observed by late authors, where a collection of blood is sometimes found within the tunica albuginea testis, and is supposed to be a kind of hæmatocele, or more probably varicocele. Sometimes the collection is so considerable, that a fluctuation resembling that of an hydrocele of the vaginal coat of the testicle is observable. When this is mistaken for hydrocele, and an opening is made into it with a trocar, a discharge is produced of a dusky-coloured blood, somewhat resembling thin chocolate: but though the tumor may be diminished by the evacuation thus obtained, yet the alteration is inconsiderable; nor is the patient ever relieved, but on the contrary made worse by such an operation. Castration, after this, becomes necessary; but even this has been found ineffectual: so that the patient had better be advised to trust to nature, assisted by a proper suspensory bandage, than to suffer the attempt of a radical cure; for it has been observed, that in some instances they have remained stationary for

many years, whereas they never fail to become much worse by any attempt to evacuate the fluid.

When tumors, or the pressure of a truss, have been the cause of such complaints, a proper attention to these ought to be the first attempt towards a cure. But when a relaxed state of the veins is suspected, we ought to recommend a suspensory bandage, an horizontal posture, the cold bath, and the application of a solution of alum and other astringents. By a proper exhibition of these, the disease may at least be prevented from increasing, so as to render any operation unnecessary.

By *spermatocele* is understood a morbid distension of the vas deferens and epididymis. The disease may arise from tumors, stricture, or inflammation about the vas deferens, or its termination in the penis; but more probably from inflammation there. When an inflammatory disposition is discovered, general and topical blood-letting, gentle laxatives, a low cooling diet, and rest of body, will commonly be found the best remedies. When tumors are found to press upon the vas deferens, they ought either to be brought to a state of suppuration, or entirely extirpated, if that can be properly effected. If the disease proceed from a venereal cause, nothing can be so useful as a course of mercury properly directed.

By *pneumatocele* is understood a distension of the scrotum from a collection of air.

The principal cause of this disease, which rarely happens, is wounds in the lungs, by which air passes through the common cellular substance into the scrotum; but from whatever cause the tumor is produced, the disease is to be treated by making small punctures with the point of a lancet, as in the case of anasarca swellings formed by water.

CHAP. XXVI. Of SARCOCELE, or SCIRRHOUS TESTICLE.

SARCOCELE implies a fleshy, enlarged state of the testicle, much firmer and harder to the touch than is observed in hernia humoralis or inflamed testicle.

Symptoms.] The symptoms vary exceedingly in different patients; but the following are the most general: the first symptom is commonly a small enlargement, without much pain, and no discolouration of the part. The tumor becomes gradually larger, and the hardness increases; but for a considerable time the surface remains smooth; and when the constitution is otherwise good, the disorder will sometimes remain in this situation for a considerable number of years; and in a few rare instances, by a moderate diet, keeping the belly open, suspending the tumor properly, and avoiding violent exercise, or any thing which may considerably increase

the impetus of the blood, the disorder has not only been prevented from increasing, but has in a gradual manner disappeared entirely. More commonly, however, the tumor increases in size, and becomes ragged and unequal on its surface. Smart and severe shooting pains are frequently felt through its substance. Sometimes serum is extravasated in the vaginal coat, or matter is collected in different parts of the tumor. The scrotum, now much distended, bursts, and thin, fetid, bloody matter discharging, the disease terminates in an ulcerated cancer of the worst kind.

The spermatic cord is commonly unaffected till the tumor has acquired a considerable size, and generally not till collections of matter have been formed. After this, from being at first only slightly swelled, it gradually increases in hardness and bulk; after which it becomes very painful, knotty, or unequal through its whole extent. The discharge from the scrotum still continues; but although the matter increases in quantity, the size of the tumor is not thereby diminished, but, on the contrary, continually increases; the edges of the sore become hard, livid, and retorted, and fungous excrescences push out from every part of it; the health of the patient becomes entirely destroyed, and he is at last carried off in great misery.

Hernia humoralis produced by venereal infection has been considered, by some authors, as a frequent cause of the worst kind of scirrhus testicle; but the fact is very much otherwise; and such an idea has this bad tendency, that it prevents the perseverance in the use of such remedies as might have removed the disease without the necessity of extirpation.

Another cause mentioned by authors as producing scirrhus of the testicle, is the hydrocele of the vaginal coat; but though sarcocele is frequently combined with this disease, there is every reason to think that the primary disorder was in the testicle itself, and that the water is only a consequence of the other complaint. When the hydrocele happens to be the original disease, the testicle is also found frequently altered in its appearance. It is here paler than in its natural state. It is sometimes diminished, but more frequently enlarged. The enlargement, however, is soft, harmless, and free from pain; and in such a situation should never be extirpated. To this point particular attention ought to be paid, otherwise we run the risk of committing a mistake, into which practitioners have been too frequently led—the extirpation of a testicle which ought to have been saved. To keep free of this error, we ought to attend to the following circumstances.

When the disease begins in the testicle itself, especially in the body or glandular part, or when it becomes hard and enlarged previous to any collection of water in the vaginal coat, it is to be considered as of a different nature from that in which an enlargement of the part succeeds to a collection of water; or if, upon

evacuating the water, the testicle be found hardened, enlarged, and attended with pain and other marks of scirrhus, especially if the surface be unequal or ulcerated, extirpation ought certainly to be performed. The symptoms above mentioned sometimes, though rarely, begin in the epididymis. In such cases, however, extirpation will seldom be advisable, as there is here always a suspicion of a venereal affection; and then we ought by all means to try the remedies commonly used in such diseases. In the prognosis, we attend to the age and the habit of the body, as well as to the state of the disease, and length of time it has continued.

When the patient is young and the constitution unbroken, we may always hope for a cure, although the symptoms should be very considerable; whereas, in old infirm people, and in habits attended with an emaciated look, with indigestion, and other symptoms of obstructed viscera, whatever state the disease may be in, there will be but a small chance of success.

If the disease has subsisted for a long time without considerably increasing in size, we may reasonably think it is of a milder nature than where it has made a rapid progress. As long as the testicle is only hard, and free from the formation of matter, we may expect a favourable event; but where collections of matter have already formed, either in the substance or upon the surface of the testicle, there is no other chance of saving the patient than by means of extirpation. Previous to this, however, we are to attend to the state of the spermatic cord; for were any of it left in a diseased state, little advantage could be derived from extirpation; nor ought the operation ever to be performed but where we can reach the whole of the diseased parts. We are not to be prevented from performing it, though the cord should be considerably enlarged, provided it do not evidently partake of the disease of the testicle; for the cord is generally somewhat enlarged in the diseased state of the testicle; but this enlargement is for the most part merely either a varicose state of the veins, or a watery disposition of the cellular substance.

Cure by the operation.] But supposing no obstacle to the operation, the method of doing it may be this. The parts being previously shaved, the patient is to be laid upon a square table of about three feet four inches high, letting his legs hang down: which, as well as the rest of his body, must be held firm by assistants; or he may be laid across a bed in the same manner. Then with a knife the incision is to be begun above the rings of the abdominal muscles, that there may be room afterwards to secure the vessels; then carrying it through the membrana adiposa, it must be continued downward to the bottom of the scrotum. A firm, waxed flat ligature, composed of small threads, is next, by means of a curved needle, to be passed round the spermatic cord, at least an inch above the diseased part, or as near the abdominal ring as

possible; after which the vessels are to be secured by a running knot, and divided about a quarter or half an inch below the ligature. The cord and testicle are then to be removed from the surrounding parts by dissecting from above downwards, and no instrument is better for this purpose than the common scalpel. After the diseased parts are removed, the knot upon the cord must be slackened to discover the spermatic arteries and veins; both of which, by means of the tenaculum or a common forceps, are to be taken up. The ligature upon the spermatic cord is now to be left loose, so as to act as a tourniquet if a hemorrhagy should ensue; nor is there more occasion for leaving the ligature tied than for leaving a tourniquet firmly applied to one of the extremities after amputation; besides, where patients have suffered such pain as is sometimes mentioned by authors, it has been found to be owing to the tightness of the ligature rather than to any other cause. In dividing the ligatures of the blood-vessels at the extremities of the cord, they must be left at such a length, without the wound, as to be readily removed, however much the cord may retract in the time of the cure.

In separating the testicle, a considerable hemorrhagy sometimes ensues from the division of the scrotal arteries. In such a case, they ought always to be fixed with ligatures before proceeding in the operation. The parts being removed, and the blood-vessels secured, the wound is to be cured, if possible, by the first intention; and for this purpose the sides of the scrotum are to be brought together in the most accurate manner, beginning at the under end, and securing the parts by adhesive plaster as we proceed upwards, and in such a way that the sides of the fore may be kept properly together. About two inches of the ligatures of the cord are to be left out, and this part of the wound treated in the same manner as the rest; the whole to be secured by a compress of linen and a T bandage.

Subsequent Treatment.] The patient should now be laid to rest, and an opiate administered; and if, upon the second or third day, any inflammatory symptoms ensue, they are to be removed by methods commonly employed upon these occasions; as, topical blood-letting, gentle laxatives, and keeping the part constantly moist with a solution of vitriolated zinc. The dressings ought not to be allowed to shift, else the cure will be greatly retarded. They are to be examined about four or five days after the operation; and if nothing material has happened, they may be allowed to remain two or three days longer, by which time generally the ligature can be readily removed; and the wound will be healed by the first intention, excepting some small opening in the skin, more especially where the ligatures were placed. These are to be drawn together by adhesive straps, and dressed in the same manner as formerly. In this way, if the patient be otherwise healthy, a cure may be expected in little more than a fortnight.

The method of dressing most frequently practised is to apply a quantity of soft lint to the sore, and then a compress of linen over it, and to secure the whole with a T bandage or a suspensory bag. But whatever course may be taken in this respect, the sore is not to be touched till a free suppuration takes place, which will commonly be about the fifth or sixth days, and then the dressings should be removed and renewed from time to time; once every two days or oftener, as the quantity of matter may render it necessary. Sometimes after the operation the patient complains of pain in the sore, and of tension and uneasiness in the belly. In such a case, warm fomentations should be applied to the abdomen, and the sore covered with an emollient poultice, and this repeated as often as may be necessary.

CHAP. XXVII. OF CALCULI.

SECT. I. *On the nature of URINARY CONCRETIONS in general.*

It is only since the time of *Scheele* that we have become acquainted with the nature of urinary calculi, this subject having been quite in the dark before that great chemist discovered, in the year 1776, a peculiar acid (the *lithic acid*) in them, and at the same time found them to contain no lime, a circumstance which was soon after confirmed by the experiments of *Bergmann*. From this period, the chemists bestowed a particular attention upon the examination of urinary concretions, as appears from the writings of *Dobson*, *Percival*, *Falconer*, *Achard*, *Hartenkeit*, *Tychsen*, *Link*, *Titius*, *Walther*, *Gartner*, *Brugnatelli*, *Pearson*, and several others, some of whom confirmed the discovery of *Scheele*, while others contradicted, and others enlarged it.

But we are particularly indebted to *Cit. Fourcroy* and *Vauquelin*, who, since 1786, had turned their attention to this subject, for having made many experiments, by which great light is thrown on the subject. We deem it highly proper to communicate to our readers in the following extract, the interesting results of their chemical enquiries, principally on account of the influence they have on the treatment of the diseased state of those parts on which urinary calculi are deposited.

Seat and physical properties of Urinary Calculi.] Calculi are found in different parts of the urinary system, in the pelvis renalis, in the ureters, in the bladder, and urethra; but as they, for the most part, originate in the pelvis renalis, the calculi renales make the nucleus of the greatest number of urinary stones. The *calculi renales* differ greatly with respect to their external qualities; for the most part, however, they consist of small, concrete, roundish, smooth, glossy, and crystalline bodies, of a red-yellow colour, like

that of wood, and so hard as to admit of polishing. On account of their minuteness, they easily pass through the urinary passages in form of gravel, which being sometimes of a rough surface, cause several complaints on their passage. But in some instances they are of too great a size to be able to penetrate through the ureters; in which case they increase in the kidneys, to the manifest injury of them. Calculi renales of this kind are generally of a brown, dark red, or black colour, and surrounded with several strata of coagulated blood and pus; they have also been observed of a yellow, reddish, and lighter colour; and some consisting of an homogeneous stony mass: but white or grey calculi renales are very rarely to be met with. Amongst the great number that were examined by Fourcroy, he only found one or two of a grey or blackish colour, and a composition similar to those which generally bear the name of mulberry-like stones.

The stones in the ureters are calculi renales, which on passing into the ureters are prevented by their size from descending into the bladder, and frequently increase very much; they, however, rarely occur, but still rarer are the internal stony coverings of the ureters, which entirely obstruct the passage of urine; their colour is white, and they consist of phosphat of lime.

The stones in the bladder are the most frequent urinary concretions, that have been principally examined; they draw their first origin from the kidneys, whence they descend into the bladder, where they increase, or they immediately originate and increase in the bladder; or they arise from a foreign body that by chance has got into the bladder, which not unfrequently happens, particularly in the female sex. Concretions of this kind differ greatly in their respective physical qualities and external form, which, however, is generally spherical, oval, or compressed on both sides; and sometimes, when there are several stones in the bladder, they have a polyedrous or cubical form; their extremities are frequently pointed or roundish, but they are very seldom found cylindrical, and more rarely with cylinders at their ends.

There is a great variety in the size of the calculi, and likewise in their colour, which is materially different according to their respective nature and composition. They occur, 1. of a yellowish colour, like wood, approaching nearly to red or brown; such stones consist of lithic acid. 2. Grey, or more or less white; these stones always contain phosphats of earths. 3. Dark grey or blackish; stones of this colour have oxalats of earths. Many stones shew brown or grey spots on a yellow or white ground, generally raised on the surface, and consisting of oxalat of lime, which is inclosed in lithic acid when the ground colour of the stone is of a wood colour, or in phosphat of lime when it is white. These spots are, in general, only to be observed in the middle of the stone, or at one of its extremities. All that has been stated

is the result of observations on more than 600 calculi; and different other colours that are said to have been observed, either arise from heterogeneous substances, or are merely variations of the above colours. Their surface is smooth and polished in some, in others only smooth, and in others uneven, and covered with rough or smooth corpuscles, which are always of a yellow colour; in some the surface is partly smooth, and partly rough. The white ones are frequently even and smooth, half transparent, and covered with shining crystals, that generally indicate phosphat of ammonia with talc; or they are faint, and consist of minute grains; or rough, in which case they consist of phosphat of lime. The brown and dark grey stones are, from their similarity to mulberries, called mulberry-stones, and being frequently very rugged, they cause the most pain of all.

On examining the specific weight of urinary calculi in more than 500 specimens, it was found to be in the lightest 1,213: 1,000, in the heaviest, as 1,976: 1,000. Their smell is partly strong, like urine or ammonia, partly insipid, and terreous; for instance, the white ones, which are like sawed ivory or rasped bone.

The internal texture of calculi is but seldom guessed from their external appearance, particularly when they exceed the size of a pigeon's egg. On breaking them they generally separate into two or three strata, more or less thick and even, which prove that they are formed by different precipitations at different times. In the middle a kernel is generally seen, of the same mass as the rest. When the place they are broken at is finely streaked, and of a yellow or reddish colour, the lithic acid predominates; but when they are half transparent, luminous like spar, they have ammoniacal magnesia in them, and phosphat of lime when they are brittle and friable; but when they are so hard as to resist the instrument, of a smooth surface, and a smell like ivory, they contain saccharic lime. It frequently happens, that the exterior stratum consists of white phosphat of earth, while the kernel is yellow lithic acid or oxalat of lime, covered sometimes with a yellow stratum of lithic acid, in which case the kernel appears radiant; but when it consists of lithic acid, and is covered with white phosphate of earth, it is roundish, oval, and somewhat crooked. These concrements have very seldom three strata; namely, on the outside a phosphat of salt, towards the inside lithic acid, and quite within side, an oxalat of lime; but still rarer these substances occur in more strata or in another order, as before mentioned. Stones of the urethra are seldom generated in the urethra itself; however, there are instances of their having been formed in the fossa navicularis by means of foreign bodies that have got into the urethra. We also very frequently observe stony concrements deposited between the glans and prepuce. All the concrements produced within and outside of the urethra consist of phosphats of earths,

which are easily precipitated from the urine. There are likewise stones in the urethra, which have come out of the bladder, having been produced there, or in the kidneys, and they generally possess the properties of stones of the kidneys.

Constituent particles of urinary stones.] It has been mentioned above that Scheele found a peculiar acid in the urinary concretions, and likewise that phosphat of lime was discovered in them. The identity of the lithic acid, however, was much doubted by modern chemists, particularly by *Pearson*, who asserted that it was merely an oxyd, whereby he gave rise to the discoveries *Cit. Vauquelin* and *Fourcroy* since made on this subject, because they were induced to repeat the experiments which had been proposed to the public, in order to examine whether the lithic acid be really an acid, or to confirm the former opinion of it. Their endeavours were fully rewarded, as they not only found the lithic acid and phosphat of lime in the different calculi, but also five other substances, viz. the lithat of ammonia, oxalat of lime, siliceous earth, phosphat of ammoniacal magnesia, and an animal matter.

1. *Lithic or uric acid.* The acid discovered by Mr. Scheele in the urinary concretions was styled lithic acid; or, according to Dr. Pearson's researches, uric acid, which, after Scheele, has the following properties. It is insipid, without smell, hard, crystallizable, not soluble in cold water, and in boiling water only in several thousand times greater quantity. This solution, after having become cool, deposits the acid in form of minute yellow needles, easily soluble in the ley of fixed alkalis, out of which, however, it is precipitated by all acids, even the carbonic acid, except the sulphuric and muriatic acid, which have no effect on it. Concentrated nitric acid, on dissolving it, obtains a red colour. On distilling the lithic acid it yields a small quantity of sublimed, undecomposed uric acid, very little oil and water, crystallized carbonat of ammonia, carbonic acid, and a very black coal, which, however, contains neither alkali nor lime. Besides these properties, it possesses still others, according to our researches. On rubbing it with concentrated ley of kali or natron, it immediately forms a saponaceous, thick, and pulpy mass, which is very soluble in water when supersaturated with alkali, but little soluble when only saturated with it. The saturated combinations have little taste, are not crystallizable, and when diluted with water, the muriatic acid precipitates the uric acid in form of small, needle-like, shining, somewhat yellowish crystals. Ammonia receives very little of it, which combination is almost quite indissoluble. Lime water has likewise very little effect on it, and the carbonats of alkalis none at all. On being dissolved in nitric acid, a part of the lithic acid is changed into oxalic acid. The red colour which appears after this combination is said to prove, according to Pearson, that substance to be merely an oxyd, but it arises from a pecu-

lar animal matter. When oxygenated muriatic acid is brought in contact with lithic acid, the colour of it grows pale, it puffs up, becomes soft and gelatinous, and at last obtains the consistency of a milky liquor; from which process only $\frac{1}{60}$ of a white, light, animal substance remains, and a quantity of carbonic acid evolves itself under continual flow effervescence. The liquor yields muriat of ammonia, oxalat of ammonia, both in crystals, free muriatic and malic acid; consequently the oxygenated muriatic acid separates the uric acid into ammonia, carbonic acid, oxalic acid, and malic acid, whereby we observe that the oxygenated muriatic acid changes the uric acid, first into ammonia and malic acid, but on the addition of more acid, into oxalic acid; and when still more acid is added, into water and carbonic acid. The remaining white substance is the same, from which the red colour originates that appears on the combination of the uric acid with nitric acid, and which imparts the cubical form to the muriat of ammonia, obtained by the evaporation of the liquor. It remains now to be stated what is observed in the distillation of that acid, at which it yields not only carbonat of ammonia, but also carbonic gas, very little oil, Prussic acid, partly in form of gas, partly in a fluid form, a considerable quantity of coal that contains no salt, and a little water. The productions thus obtained have the smell of bitter almonds. The results of these enquiries manifestly shew, that the lithic acid is really an acid of its own, consisting of azote, carbon, hydrogen, and oxygen. This peculiar acid is an excrementitious substance, which is carried off by the urine, and at the forming of calculi combines itself with a coloured animal matter, from which also it probably originates by a process still unknown.

2. *Lithat of Ammonia.* This substance seems to have been unknown before, or at least not properly discerned from the uric acid, and though Scheele has observed it, he was ignorant of its particular nature. It is easily to be distinguished by the small even strata in which it is formed, by its colour, that looks like milk coloured with coffee, and by its forming but small calculi. It dissolves in the lees of kali and natron like the lithic acid, but with the characteristic difference that it discharges ammonia, a phenomenon already observed by Scheele. It is more soluble in cold as well as warm water, than the lithic acid. It is in the same way affected by acids, except that a greater quantity is required for changing it. It is generally mixed with phosphat of ammoniacal magnesia, because it seems only to take place after a sufficient quantity of ammoniacal magnesia has been formed, to saturate the phosphat of kali and the free uric acid.

3. *Phosphat of lime.* The existence of this substance had hitherto been but inaccurately determined, every substance which was not lithic acid being formerly comprised by the name of phosphat of lime. It occurs in small friable strata, which break in

scales or splints of a grey white colour, and are faint, opaque, without any smell or taste, and crystallized in a luminous or spar-like form; instead of strata it is frequently composed of friable grains, that slightly cohere, and has many holes and pores like a spongy texture. It never forms calculi by itself, being, in a calculus, always united with an animal gelatinous matter; on account of which circumstance it becomes black by exposing it to a strong heat, and burns to coal, exhaling the odour of burned bones; and yields water, oil, carbonat of ammonia, and a carbonaceous residuum. Being calcined white, it only leaves lime, and phosphat of lime, without any water of crystallization. It is not soluble in cold water, but in boiling water a part of its gelatine dissolves, spreading an animal odour. All acids, except the boracic and carbonic acid, dissolve it, leaving on the bottoms of the vessels transparent spots of animal matter. These solutions are all precipitated by alkalis, but without any decomposition, the precipitation remaining phosphat of lime. On treating the phosphat of lime with concentrated nitric acid, a thick pulpy mass of acid sulphat and phosphat of lime will be obtained, on which pure alkalis, as well as carbonat of alkalis, have no effect. We never could find acid phosphat of lime, as Brugnatelli pretends to have observed.

4. *Phosphat of ammoniacal magnesia.* It consists of scaly, half-transparent, hard and coherent strata; can be sawed without crumbling, and reduced to a fine soft and white powder. It is of a sweetish insipid taste, somewhat soluble, and crystallized in rhomboids, or thick laminas, dispersed in the cavities of other calculous substances, and it is frequently found on the surface of other concrement. It contains betwixt its strata a gelatinous substance, but less than the phosphat of lime, on which account it also blackens by being heated. Though it be but little soluble in water, yet it dissolves in such a quantity as to be capable of crystallizing by slow evaporation. Acids dissolve it more quickly than they do the phosphat of lime. Weak sulphuric acid entirely dissolves it, forming sulphat of ammoniacal magnesia. In diluted muriatic or nitric acid, it disappears more quickly than the phosphat of lime. Ammonia, by which the salt is made turbid, only precipitates small particles of magnesia. The lees of fixed alkalis disengage from it ammonia, without forming with it a solution; and depriving it of the phosphoric acid, leave the magnesia behind.

5. *Oxalat of lime.* It is, according to our observations, only found in the mulberry-like calculi, in combination with a coloured animal matter, and consists of strata covered with pointed, roundish, rough or smooth protuberances: outside it appears of a dark or brown colour, but internally it is grey, frequently with white streaks, of a solid texture, and may be polished like ivory; it breaks in scales, or in the shape of shells; and, on being pounded or sawed, it exhales an animal odour like semen. It is the heaviest

of all calculous substances, and the only one which yields one-third of lime by calcination. It dissolves with difficulty in acids, and is precipitated, unaltered, by alkalis, from nitric acid. The fixed alkalis decompose it when they are impregnated with carbonic acid, and when it is pulverized, and the solution heated, whereby carbonate of lime and oxalat of alkalis are obtained.

The great quantity of animal matter which constantly adheres to this oxalat of lime is very characteristical, which imparts the brown, reddish, blackish colour to the above kind of stones, and likewise the fine and solid texture. This substance may be obtained by putting small pieces of these stones into diluted nitric acid, whereby it appears of the same colour, and becomes soft and spongy. The great hardness of this kind of calculi, most probably arises from the intimate connection of its particles, produced by the combination of the oxalat of lime with that animal matter, in the same way as lime obtains a great degree of solidity by its combination with albuminous matter, of which, and of a peculiar matter of urine, that animal substance seems to consist.

6. *Siliceous earth.* Amongst 600 calculi which we examined, there were only two that contained this earth; both had the texture of mulberry-like stones, though of a lighter colour, and by being calcined lost one-third of their weight, without giving free lime; heated with acids they lost nothing, but when melted with four times as much of alkali, they yielded siliceous earth, by being treated with muriatic acid. They contained phosphat of lime, and an animal matter similar to that which is united with the oxalat of lime. They were hard, difficult to be sawed and pulverised, and the powder made scratches in metal. On being burnt they emit an animal odour; they imparted nothing to the boiling water, and to the acids a little phosphat of lime, which difficultly separates from the siliceous earth. Alkalis, either pure, or combined with carbonic acid, did not affect them, merely depriving them of a part of their animal matter. Their essential character consists in their being fusible and vitrifiable with fixed alkalis.

7. *Animal matter.* All the six substances just examined, which constitute the urinary stones of the human species, are always combined with an animal matter, as appears from its being burnt to coal, from the productions it yields by distillation, from its stench on being burnt, and from the cellulous membranous flocculi which remain when pieces of calculi are dissolved in diluted acids. This animal matter has been frequently, and with good reason, considered as the basis of all urinary concretions, like as in bones the gelatinous matter, the first basis of the bones, forms an organic texture, in the interstices of which the phosphat of lime is deposited. It is very remarkable, that the different constituent particles of urinary stones are combined with a dissimilar animal matter, which is sometimes albuminous, sometimes gelatinous,

sometimes composed of both, and frequently united with the matter of urine. Thus the lithic acid, or the lithat of ammonia, contains a third of albuminous matter; combined with the matter of urine, the phosphats of earths, albuminous matter, gelatina in form of membranes, and laminas, or tela cellulosa; the oxalat of lime, a spongy, yet more solid texture of the colour of albumen, and the siliceous earth, a similar substance. On the whole, the animal matter seems to unite and join together all the acid and saline particles of urinary concretions.

[*Classification of urinary stones.*] The old classification of urinary calculi, made according to their figure and their size, cannot at present, where we have acquired so accurate a knowledge of their internal nature, be retained, as they ought rather to be classed according to their constituent particles; however, no regard is to be had to the animal matter, as being found in all urinary concretions, and having no influence on their respective difference. On comparing the results of the analyses of more than 600 stones, we are induced to bring them under three genera; *the first* of which comprehends such stones as are merely composed of one substance, besides the animal matter; *the second* contains urinary concretions, consisting of two stony substances, besides the animal matter; and *the third* comprises all those which are formed by more than three calculous substances. These three genera comprehend about 12 species, namely, the first genus three, the second seven, and the third two; all of which we shall now describe; but we must previously remark, that the number of the genera, as well as of the species, is only determined after the observations hitherto made, and may consequently be increased in future.

1. *The first species* of urinary concretions consists of lithic acid; and stones of this kind most frequently occur, as there were amongst 600, about 150. They are easily distinguished by their reddish or high yellow colour, much resembling that of wood, by their brittle, radiant-like, homogeneous, and fine texture, and by their perfect solubility in the leys of fixed alkalis, without disengaging the smell of ammonia. Their size varies from the bigness of a pea to that of a duck's egg, &c. and their figure is roundish, spheroidal, compressed, oval, oblong, &c. the surface polished like marble, but frequently rough and warty; of a crimson light red, yellowish, light brown colour, but never white, grey, or black; their strata differ in number and thickness, and are frequently of a smooth surface. The specific weight of these stones is from 1,276, to 1,786, but generally more than 1,500. The urinary concretions in the kidneys are mostly of this species.

2. *The second species* is composed of lithate of ammonia, and differs from the former by disengaging ammonia on their being dissolved in the leys of fixed alkalis. Concretions of this kind are generally small, of a pale or grey colour, and consist of fine

strata, easily separable from each other; they mostly contain a kernel, which is easily separated from the strata that cover it.— Their figure is generally oblong, compressed like almonds, and of a smooth surface, which is frequently crystalline. Their specific weight varies from 1,225 to 1,720. They are entirely soluble in water, particularly when previously pulverised. All acids, principally the muriatic acid, deprive them of the ammonia, leaving the pure lithic acid behind. They are frequently found covered with a thin stratum of lithic acid. Amongst 600 calculi there were but few of this kind.

3. *The third species*, consisting of oxalat of lime, are easily to be distinguished by the protuberances and inequality of their surface, whence they have got the appellation of mulberry-like stones; by their hardness, grey colour, solid texture, their polish like ivory, in the inside, and their particular smell on being sawed, which resembles that of semen. A peculiar characteristic, which distinguishes them from all others, consists in their leaving lime after the calcination, in their being with difficulty soluble in acids, and not soluble in alkalis, and, at last, in their being decomposed by the lees of carbonats of alkali. They weigh from 1,428 to 1,976, and their size varies from that of a calculus renalis to the bigness of an egg or more; their figure is generally spherical or spheroidal. They often make the kernel of other stones, in which case they belong to another species. In 300 stones they bore the proportion of about $\frac{1}{4}$ or $\frac{1}{3}$.

4. *Stones of this species* contain lithic acid and phosphat of earth, but in a separate state. Their surface is white, cretaceous, brittle, and half-transparent, as it either consists of phosphat of lime, or of phosphat of ammoniacal magnesia, the kernel being formed by lithic acid; thus both constituents are exactly separate from each other. They were found in the proportion of $\frac{1}{12}$ amongst the stones that were examined by us, and they grow bigger than any of the rest, as they appear from the size of an egg to that of the whole bladder, even when extended. They generally have an oval form, often pointed at one end, of a smooth surface, which, however, is frequently covered with crystals of phosphat of ammoniacal magnesia. Sometimes the lithic acid in the middle is alternately covered with phosphat of lime, and phosphat of ammoniacal magnesia. The specific weight of these stones is extremely variable.

5. *The fifth species of calculi* contains, likewise, lithic acid and phosphats of earth, but intimately mixed with each other. Of these stones a great many varieties are observed, depending on the proportionable quantity of their constituent particles, as well as on the strata in which they lie above one another. The chief constituents, the phosphats of earth, are separated in different strata, but sometimes so intimately mixed with each other, that it is impossible to distinguish them with the eye; and the analysis could

only shew their difference. From this circumstance arise the variety in the colour, figure, and number, of the strata. The colour, however, is generally grey, but frequently variegated like marble, sometimes like soap. Their figure is irregular, oval, or globular, and the surface mostly brittle, cretaceous, or whitish, so as to make us believe that they only consist of phosphat of lime. The polyedrous stones generally belong to this species, when they have the appearance of being worn away by rubbing. They make about $\frac{1}{5}$ of the stones we have examined. Their specific weight varies extremely, the least being 1,213, the greatest 1,739.

6. *This species* is constituted by lithat of ammonia and phosphat of earth, *i. e.* of lime and ammoniacal magnesia; and resembles in its external appearances the fourth species. One of the constituents, generally the lithat of ammonia, makes the kernel, while a mixture of the two others, but rarely one by itself, forms the crust. Sometimes, however, the kernel contains also the phosphats, and the crust a little lithat of ammonia, which, even in some varieties, is mixed with pure lithic acid. The strata in stones of this kind are more easily separable, and always smaller than those of the fourth species. Their specific weight is 1,312 to 1,761; and they are more rarely met with than most of the rest. Amongst 600 there were only 20 of this kind.

7. Stones of the *seventh species* consist likewise of lithat of ammonia and phosphat of earths, but intimately mixed with each other. They are of a paler colour, much lighter than the fifth species, and disengage a great deal of ammonia on their being treated with kali. We found them only in the proportion of $\frac{1}{40}$, amongst the stones which we have analysed. They never grow so large as the two former.

8. The constituent particles of the *eighth species* are phosphat of lime and phosphat of ammoniacal magnesia. The pure white colour, the friability, their being insoluble in alkalis, and their easy solubility even in weak acids, constitute the chief characteristics of this sort of stones, of which we found about 60 amongst 600: Sometimes they are of an enormous size, of irregular form, rarely round, but frequently of an uneven surface, and resembling an incrustation. Their texture is formed of white brittle strata, sometimes interwoven with solid half-transparent crystals of ammoniacal magnesia. The crusts formed on foreign bodies that happened to penetrate into the bladder, belong to this species; the specific weight of which is 1,138 to 1,473.

9. This species of stones contain oxalat of lime, but externally uric acid, in more or less quantity, and are only to be distinguished by the kernel from the first species. The proportion of both constituents, and the specific weight, vary extremely, the latter being 1,341 to 1,754. Sometimes the kernel, consisting of oxalat of lime, is only covered on one side with uric acid, and discernible on

the other by the protuberances with which the surface is variegated; which variety, however, seldom occurs.

10. Stones of this species have, in their centre, oxalat of lime, surrounded by phosphat of earths; the kernel is grey or brown and radiant-like, the crust white and cretaceous; their size and figure differ extremely, and their specific weight is from 1,168 to 1,752. They amount to $\frac{1}{3}$ of the stones we have examined.

11. This species contains stones composed of three or four calculous substances, namely, of oxalat of kali, phosphat of earths, and of uric acid, either pure or combined with ammonia. They rarely occur; and amongst 600 stones we only observed ten or twelve. They often consist of three distinct strata, viz. In the interior, of oxalat of lime; in the middle, of lithat of ammonia; and the exterior, of phosphats of earth, which are frequently mixed with uric acid, or lithat of ammonia, all which are distinguished on their being sawed through. This species comprehends three varieties; the first of which consists of oxalat of lime, uric acid, and phosphats of earth; the second contains lithat of ammonia, combined with pure uric acid, and the two other constituents; the third has, besides these two substances, free uric acid and lithat of ammonia, mixed with the phosphats of earth. We forbear to mention other varieties of this species, as being less remarkable and instructive.

12. The last species of calculus is of a very complicated composition. The siliceous earth seems to have taken the place of the oxalat of lime; it is mixed with uric acid and lithat of ammonia, and covered by phosphats of earth. Stones of this kind are the rarest of all, and there were only *two* amongst 600.

Causes of the generation of urinary calculi. To enquire into the causes by which urinary concretions are produced, is both interesting and useful, however attended with the greatest difficulties. The writings of medical authors are full of conjectures and hypotheses with regard to this subject, on which nothing could be ascertained before we had acquired an accurate knowledge of the nature of urinary concretions. It is owing to this circumstance that the most enlightened physicians acquiesced in ascribing the immediate cause of them to a superabundance of terrequous matter in the urine; and Boerhaave, as well as, particularly, Van Swieten, imagined that the urine of all men contained calculous matter in the natural state, and that for the generation of stones a kernel was only required, to attract it. That this may be the case, in some instances, is proved by frequent experience; but stones produced by foreign bodies, that have accidentally got into the urethra or bladder, are always white and composed of phosphat of earths, and seldom or never covered with lithic acid, a substance which is observed to form the stones that most frequently occur; but even

in these the kernel consists of a substance formed in the body itself, as a grain descended from the kidneys, &c. which must, therefore, have necessarily originated in a peculiar internal cause. A superabundance of uric acid in stony patients, and its more copious generation than in a sound state, though it seems to be one of the principal and most certain causes, is by no means satisfactory, as it only explains the precipitation of stony matter from the urine, but not why it unites in strata. A coagulating substance is required for separating, attracting, and, as it were, agglutinating the condensable particles that are precipitated. This substance is undoubtedly the animal matter which we have constantly found in all calculous masses, and which seems to constitute the basis of stones, like the membranous gelatina that of bones. It is known that the urine of calculous patients is generally muddy, ductile, in threads, slimy, and as if mixed with albumen, which quality it obtains at the moment when the ammonia is disengaged, or on the addition of kali that separates it from the acid in which it was dissolved; and in all cases of superabundance of lithic acid the urine contains a great quantity of that animal matter, which promotes the precipitation of it, and attracts and unites the particles thus separated.—Hence it appears, that every thing capable of increasing the quantity of that pituitous gluten in the urine, may be considered as the remote cause of calculous formations. And the old ideas on pituitous temperaments, or superabundant pituita, &c. which were thought to dispose people to the calculus, seems to be connected with the late discoveries on the nature of urinary stones. Though the animal matter appears to be different in different calculi, yet it is certain, that every calculous substance contains an animal gluten from which its concrete and solid state arises; whence we may fairly state the superabundance of that substance as the chief and principal cause of calculous formation.

There are, however, other causes which seem to have a particular influence on the nature of urinary stones and the strata in which they are formed; but it is extremely difficult to penetrate and to explain them. We are, for instance, entirely ignorant of the manner in which urinary stones are formed from the oxalat of lime; though from their occurring more frequently in children than in adults, we might be entitled to ascribe them to a disposition to acor, a cause considered by Boerhaave as the general source of a great number of diseases incident to the infantile age. This opinion seems to be proved by the ideas of Bonhomme, physician at Avignon, on the oxalic or saccharic acid, as the cause of mollities ossium in the rickets; by this acid being discovered in a species of saliva by Brugnatelli; and, lastly, by an observation of Turgais, who found this acid in the urine of a child diseased with worms. We but rarely observe saccharic acid in the human body, which appears to be mostly adventitious, and by which the animal matter

is rendered coagulable, and deposited or precipitated with the oxalat of lime; or the oxalic acid decomposes the phosphat of lime, and forms an insoluble combination incapable of being any longer kept dissolved in the urine. It is, however, extremely difficult to determine how far the constitution of the body is connected with that particular disposition in the urine, of precipitating sometimes phosphat of lime mixed with oxalat of lime, sometimes phosphat of ammoniacal magnesia, either by itself or mixed with lithic acid, &c. &c. Who can explain the reason, why of 600 stones there were only two in which siliceous earth could be traced? Still more difficult it is to explain the causes why the above substances precipitate either at once or in different strata; but it may suffice to have shewn how many observations and experiments are required, and what accurate attention and perseverance are necessary in order to throw light on so difficult a subject. We are only enabled to obtain satisfactory explanations concerning those questions by an accurate chemical analysis of the urine of calculous patients in different years of their age; an undertaking which, however difficult, has enriched us with some interesting and successful results, but which would be an enquiry too extensive to be properly undertaken in a practical work.

SECT. II. *Of Stone in the BLADDER.*

A variety of causes have been assigned as tending to the formation of calculi in the bladder; as we have just now seen. After a calculus has begun to be formed, it sometimes acquires a great size in a few months from the first obvious symptoms; but sometimes it remains in the bladder for many years without arriving at any considerable size. We shall now, under distinct heads, speak of the symptoms, modes of treatment, &c. common in such cases.

Symptoms of Stone in the Bladder.] The symptoms commonly come on gradually, and bear some kind of proportion to the size and inequalities of the stone. One of the first commonly taken notice of, is an uneasy sensation at the point of the urethra, which for some time is perceptible only upon making water, or upon using violent or jolting exercise. This sensation gradually increases; and there is also a frequent desire to make water, which is commonly voided in small quantities, and sometimes only in drops. When running in a full stream, it often suddenly stops, though the patient is conscious that a considerable quantity still remains, and feels a strong inclination to void it. If the stone be large, the patient has a constant dull pain about the neck of the bladder, and frequent desire of going to stool. The urine is generally of a limpid colour; but it is frequently thick, depositing a mucous sediment, and when the disease is violent, it is often tinged

with blood. All these complaints are greatly increased by exercise, especially by riding on horseback; and from a long continuance of pain, the patient's health by degrees becomes much impaired, and unless effectual means are employed for removing the cause of the disorder, death alone puts an end to his misery.

We are rendered certain of the existence of calculus when small pieces of stone are frequently passed along with the urine. When this does not occur, we cannot be certain that the symptoms do not arise from an ulcer or tumor in the body or neck of the bladder, or from the pressure of tumors in the neighbouring parts. In doubtful cases, however, we have one mark by which we can judge with certainty, and that is by means of sounding.

Method of sounding.] This is performed by introducing an instrument called a *sound* (Plate III. fig. 65), formed of steel, finely polished, and having the natural curvature of the urethra. The patient is to be laid upon a table or across a bed, with his shoulders raised upon a pillow, to bring the stone to the neck of the bladder, and his thighs a little elevated and separated from each other. A sound adapted to the size of the urethra is to be chosen; and previous to the introduction it is to be laid in warm water till it be of the heat of the body, and then wiped, and rubbed over with bland oil, butter, or axunge. The surgeon lays hold of the penis with his left hand, while with his right he introduces the sound with its concave side towards the abdomen. He is now with his left hand to draw the penis gently forward upon the instrument, which is to be gradually pushed into the bladder. If any difficulty occur about the neck of the bladder, this may be obviated by introducing the finger into the anus, and raising the point of the instrument; or the same purpose is more readily answered by depressing the handle of the sound. If still it does not pass with ease, much force ought by no means to be used, lest the instrument perforate the membranous part of the urethra.

As soon as the instrument enters the bladder, if it happen at once to touch the stone, a tremulous motion will be communicated to the fingers of the operator, and the business of sounding is then accomplished, the nature of the disease being now ascertained. Great care, however, is here always necessary, as a few particles of sand, or a hardened state of the bladder, have sometimes communicated the same sensation. If the stone be not soon discovered, the instrument is to be moved in all directions; and should the operator be still unsuccessful, one of the fingers of the left hand is to be introduced into the rectum, so as to raise that part of the bladder in which a stone may probably be concealed. If even this attempt prove ineffectual, the body of the patient is to be put into different positions, and perhaps one of the best is depressing the shoulders and raising the pelvis. By this means a stone may generally be felt, provided it is not contained in a cyst,

which very rarely happens. If after all these different attempts the surgeon should fail in discovering the stone, the instrument is to be withdrawn; and if symptoms of stone be strongly marked, and it appear that neither scirrhus nor inflammation, which might give rise to these symptoms, exist, a second or even a third trial is to be made on the following days.

Lithontriptics.] Various lithontriptics have been recommended for dissolving the stone in the bladder; such as lime-water, caustic alkali, soap, &c. but none of them can be conveyed in such a state into the bladder as to be much depended upon, as they undergo the greatest change in the course of the circulation. To obviate these changes, it has been recommended to inject certain fluids of this class through the urethra into the bladder: but this has not been attended with any material advantages, and has generally been found to do injury to the bladder.

Professor Mascagni of Siena, relates, in a letter to Dr. Gauri, some observations on urinary stones and gravel. The efficacy of alkalis upon them, he says, seems to consist in neutralizing the lithic acid, and by that means forming neutral salts, which dissolve easier in water than the acid itself. The urine of persons affected with the stone, always shews evident traces of lithic acid, whenever the symptoms of the stone are increasing. With this view, a solution of pure kali is sometimes successfully employed in complaints occasioned by the stone or gravel. But as the pure kali has the inconvenience of sometimes affecting the stomach and bowels by its corrosiveness, the professor was curious to know whether the carbonat of potash would have the same effect, though he was conscious of its not acting upon stony concretions out of the body, which are easily dissolved in pure kali, with which the lithic acid forms a neutral salt; whereas it seems not so nearly related with the potash, as to disengage the carbonic acid. However, being himself subject to affections of gravel, Prof. Mascagni began to take the carbonat of potash, and found it very efficacious in preventing the formation of the gravel; and during the time it was used, the traces of lithic acid entirely disappeared, but the symptoms increased when it was for some time left off.—In the urine a fine saline substance was discovered, that easily dissolved in warm water. By the continuance of the alkali, the urine seemed to become superaturated with it, and yellow vegetable colours were changed into red by it. These experiments seemed to prove, that the common kali penetrates to the urinary system, and prevents, by its combination with the lithic acid, the formation of calculus and gravel, and it is not improbable that it likewise acts as a lithontriptic; but this is to be ascertained by further experiments. The carbonic acid is very probably disengaged from the potash in the way of digestion and chylification, by which the latter is enabled to act upon the lithic acid.

Pure potash may be given to one drachm dissolved in two pounds of water, which portion is to be taken in one day. The dose of the carbonate of potash is three drachms per day. Its continued use does not seem to have any bad effect upon the organs of digestion. Professor Hufeland, in whose Practical Journal this letter is published, remarks, that his own observations perfectly agree with the above experiments, and he always found alkalis, mineral as well as vegetable, do much good in calculous affections; and on this account the waters of *Carlsbad* in Bohemia, prove extremely efficacious against them, as they contain a considerable portion of mineral alkali. He frequently saw by the use of it, calculous substances become *fabulous*. There is a remedy celebrated in Holland particularly, under the name of *liquor lithontripticus Loosii*, which contains, according to an accurate chemical analysis, *calx muriata*.

Professor Hufeland recommends it in the following form:
(No. 86.) *R. Calcis muriat. drach. j.*

Aquæ distillatæ ʒij. Fiat Solutio.

Thirty drops to be taken four times a-day, which dose may be increased, as far as the stomach can bear it.

Calculus in the urinary bladder, has in some instances been successfully treated by giving water impregnated with fixed air, by means of alkali and vitriolic acid, to which the name of *aërated alkaline water* has been given. A case in which this remedy was employed is related by Mr. Harrison, in the Memoirs of the Medical Society of London.

“ Mr. John Hobman, of Epsom, late Dantzick merchant, was the subject of this case. He was a well-made strong man, of an excellent constitution, and before this complaint could walk ten or twelve miles a-day with great ease to himself, though at the advanced age of seventy-four or five years.

“ He had been afflicted,” says Mr. Harrison, “ with calculous symptoms about two years, as nearly as I can remember, before I was consulted; and was so fully convinced in his own mind of having a stone, that he used to express himself by saying, ‘ That he felt the weight of it pressing on the neck of the bladder.’

“ He never had a severe fit till the month of January, 1779, when he was seized with a suppression of urine, to relieve which I was obliged to pass the catheter, in order to draw off his water.

“ The instrument struck against the stone in so remarkable a manner as to affect both the ear and the touch very singularly, and rather surprised me, notwithstanding I had been previously acquainted by him that there was certainly a stone in the bladder. Its magnitude I supposed to have been, from the sound and touch, about the size of a small pullet’s egg, and rather globular. A few days afterwards, I was obliged to introduce the catheter again to bring away the water, and found the stone pressing on the neck.

of the bladder, which receded the moment that the instrument touched it, and then a quantity of palish urine ran freely off.

“ From the almost continual irritation of the stone, and Mr. Hobman’s advanced age, his case was by some deemed fatal.— Nevertheless, having paid great attention to him, I was of a different opinion; apprehending from his native strength, that he had *stamina* equal to support him some years longer; a sufficient reason, I thought, to justify the trial of some lithontriptic medicine.

“ With this view I proposed a *lixivium* to be given, as prepared by Mr. Lane, an ingenious apothecary in Aldersgate-street. The physician who was consulted, preferred the use of water impregnated with fixed air, by means of salt of tartar, and weak spirit of vitriol, as recommended by Dr. Hulme in a treatise published in the year 1778, entitled, ‘ A safe and easy Remedy proposed for the Relief of the Stone and Gravel, the Scurvy, Gout, &c.’ but with which I was not at that time acquainted.

“ This *lithontriptic medicine* was given twice a-day, and after our patient had taken it about seven or eight weeks, to the best of my recollection, he was suddenly relieved one evening, by a large discharge of cretaceous, or rather stony matter in the urine, without any pain or inconvenience. It ran from him during the greater part of the night involuntarily, while he was asleep, as well as when he was awake. It soaked through the bed, and sacking of the bedstead, and ran upon the floor, staining it with a whitish grey hue, or rather with the colour of free-stone. The powder left behind upon the floor, and in the chamber-pot, was almost as fine as if it had been levigated. He never observed any calculous matter to be voided in his urine before the use of this medicine, and the whole of it was discharged in the space of five or six days.

“ From this time all symptoms of a stone in the bladder disappeared, and he recovered his strength much quicker than people in general do at his time of life; but was not able to walk so well afterwards as before; the fit seemed to have weakened his feet. I advised him to persevere in the use of the lithontriptic, lest some fragment of the calculus might remain, which he did for two or three months longer.

“ In January, 1781, he complained of costiveness and piles, and that his urine did not pass so freely as before, but rather with a contracted stream. Some lenitive electuary with *sulph. præcipit.* were prescribed; and I recommended him to use the medicine of Dr. Hulme again, but could not prevail upon him. By means of the above electuary, and *ol. ricin.* he seemed to be relieved. During the year 1782 he took but very little medicine, and his complaints were generally as last mentioned.

“ In 1783, besides an habitual costiveness, he was frequently seized with an hæmorrhoidal flux while at stool, and voided at different times large quantities of blood. These were attended

with a frequent *tenesmus*, and retention of urine; which induced me to think that some part of the stone remained still undissolved, and therefore I once more entreated him to begin with the lithon-
triptic, but in vain.

“ On the 28th of October, 1784, his complaints becoming almost insupportable, he sent for me, and I advised the immediate use of an emollient *enema* to be thrown up twice a-day, with a view to foment the parts, and empty the intestines.

29th. “ He could at this time hardly pass any urine; but by throwing up an *enema*, it enabled him by dribblets to make about a pint.

30th. “ By sitting over the steam of hot water, put into a clostestool-pan and frequently renewed, for the space of an hour, his urine dripped slowly away, but he passed a very indifferent night.

31st. “ This day there was almost a total suppression of urine; but he had three stools without assistance.

November 1. “ He informed me that he had made a little urine in the night; but that it was evacuated with the greatest difficulty. On examination, I found that there was an enlargement of the prostate gland. An emollient injection was administered in the evening, and an anodyne draught was given at bedtime.

2d. “ In the evening he had a total suppression of urine; and an *enema* was thrown up, which procured him three or four stools,

3d. “ About four o'clock in the morning I was called to him, and on my arrival informed that he could pass no urine. As soon as a warm bath could be prepared, he was put into it, and in a few minutes after he had been immersed, he voided about a pint of water. When he came out of the bath he was put into a warm bed, and a cardiac anodyne draught was given, which procured him four hours' good sleep. When he awoke, he made more water. An emulsion of *ol. ricin.* was occasionally administered, which kept the body gently open.

4th. “ A difficulty of urine continuing, I endeavoured to pass the catheter, as the frequent use of the warm bath occasioned faintness, but was prevented by a stricture in the *urethra*.

5th. “ His urine came away of itself, so as to occasion no further uneasiness, a general atony now prevailed, and he was attacked with a violent *diarrhæa*.

6th. “ From this day to the 12th (on which he expired) he daily grew worse, and the *diarrhæa* resisted every effort made use of to check or suppress it.”

After his death, it was found on inspecting the body, that the bladder contained about a quart of water, but not the least calculous concretion in it. Its coats were rather thinner and softer than usual, and the innermost one had put on a dark gangrenous

appearance. The neck of the bladder was much inflamed, particularly on its external part; and also the whole length of the *rectum*. The kidneys were found, and without any stone or gravel. The ureters were somewhat enlarged. In the *urethra* was found a stricture, seemingly caused by inflammation, and the pressure of the prostate gland, which was indurated and enlarged. All the other *viscera* were perfectly found.

This remedy, however, was employed, with others, without any permanent good effect, in the following instance, which is related by Mr. Errat in the same work.

“ Mr. Thomas D——, of G——, in the county of Norfolk, whose sufferings ended in death, on the 3d of November, 1794, at the age of twenty-seven, had, from childhood, experienced symptoms which usually accompany a stone in the bladder. These gradually increased in violence, and at length became so intolerable as to induce him to apply for advice to an eminent surgeon, whose practice in stone cases was very considerable. He was under this gentleman's care for some time, and was repeatedly examined; the result of which was almost a conviction that there was no stone in the bladder. He was put upon a course of mercurials and cicuta; used bougies, and took medicines, without any benefit. Upon taking leave, he was requested to try the effect of the *aërated alkaline water*. With this he complied, and, in the course of a few weeks, derived evident advantage from its use. By degrees all his painful symptoms left him, the bladder suffered its natural accumulation of urine to take place without any painful sensation, and discharged its contents free from difficulty or interruption. In this happy state he continued near four years, taking occasionally the saturated water; and, in pursuit of his favourite field amusements of hunting and shooting, he often underwent the greatest bodily fatigue without inconvenience. It was not until the harvest of 1793 that the symptoms recommenced, on his becoming very wet while in a sweat. From that period to the beginning of the February following, he was under the care of a medical friend of mine, from whom he experienced some relief. It was at this time my first attendance on him commenced, and opportunities occurred to me of marking particularly the symptoms and progress of the disease. His strength was much reduced, appetite extremely bad, body costive; he was also troubled with tenesmus, and an almost constant inclination to make water, which he passed in small quantities with intolerable pain. His urine was thick when made, very fetid, and deposited a sediment of a purulent appearance. The four years' perfect freedom from any of these symptoms, or any inconvenience arising from the strongest exercise; the probable conclusion that might be drawn from the examinations of a surgeon much in the habit of sounding patients for the stone; and the subsequent intervals of ease, returning strength, and perfection of

the ordinary functions of the bladder; were, in my opinion, strong circumstances against the presence either of a stone, cancer, or of any organic affection. With these impressions on my mind, the present case struck me as an instance of a local morbid irritability; and, recollecting Mr. Cline's recommending the *tinct. ferri muriati*, in partial spasm, I gave the preference to this tonic, and exhibited it in doses of ten drops, three times a-day, enjoining its increase as the stomach would bear it: to which I added a draught containing a drachm of *sp. æther. vitriol.* five-and-twenty drops of *tinct. opii*, forty of *tinct. castor.* with pennyroyal water, every night at bed-time; and some laxative pills, with *pilul. ex aloe cum myrrha*; containing also *pil. e gummi, camph. et castor*, before each dose of the drops. The apparent effects of this plan were, considerably better nights, a rapid return of appetite and strength, a total cessation of pain, regular state of the bowels, a retention of the urine in its natural quantity, without any obstruction in discharging it. This flattering change continued to increase our hopes of a perfect recovery for three weeks, during which period, notwithstanding the absence of the symptoms, the medicines were regularly continued. We found ourselves, however, too sanguine, for now a degree of uneasiness about the region of the kidneys, and in the bladder, attended with a sense of heat in these parts, came on; the appetite gradually fell off; some catarrhal affections (which we afterwards observed generally preceded the violence of the paroxysms) were likewise present, and the whole train of symptoms already mentioned, followed. In so critical a situation I did not choose to trust entirely to my own judgment, and a physician was called in. He prescribed such a plan of treatment as was likely to lessen the morbid irritability of the bladder, procure ease, and support the powers of the constitution, which, from the severity and repetition of the attacks, were evidently declining. At the end of about a month the violence of the symptoms began again to abate, the appetite returned, and he rapidly recovered. Scarcely, however, had a fortnight elapsed, before a fresh attack took place: which was longer in duration, and accompanied by greater debility, loss of appetite, strength, and flesh, than either of the preceding. The surgeon who was originally consulted, and had searched him for the stone, was now sent for. He concurred in the opinion we had formed; but, having upon examination felt through the integuments a hard body just rising above the pubes, it was concluded that a thickening of the coats of the bladder had taken place in consequence of inflammation. The plan we were pursuing was therefore changed, and emollient and cooling medicines were substituted. These were administered two or three days; the strength sunk very fast, and the pain, if possible, grew more urgent, so as to induce us again to have recourse to the former medicines. He soon got better, and enjoyed a longer

interval than hitherto from his symptoms; but the absence of these was not so complete, for during this time (which was about three months) he felt occasionally some pain, and his urine was never perfectly free from a sediment, in which there was two or three times the appearance of grumous blood. His appetite, however, was remarkably good, he grew fat, and was so well, that he performed a journey of thirty miles in an open chaise, to pay a visit to his brother, at whose house he stayed a month or five weeks, and returned to G—— by the same conveyance, without suffering any pain or inconvenience.

“From this period he had two severe paroxysms previously to his dissolution; the last of which took place in the beginning of October. The symptoms were much the same as on former attacks, excepting only that the powers of the constitution daily became more exhausted, and at length, after a very severe struggle, sunk under the conflict. On this last attack another distinguished physician was consulted; but, as all that was done was done under an erroneous notion of the true cause of the disease, it would be superfluous to give a particular detail of the treatment. I ought not, however,” says Mr. Errat, “to omit mentioning one circumstance; that, during this physician’s visit, the bottom of the body, where the hardness spoken of before was discovered, was carefully examined, but nothing of the kind could now be felt. I recollect on the first examination he was lying on the sofa in an horizontal position, he now stood in an erect one. Afterwards (the day before he died) it was again distinctly felt through the integuments, as he lay in bed.”

The following were the appearances on dissection:

“The left kidney adhered to the spleen by its external membranous covering, which was very much thickened and diseased. The whole of the kidney bore marks of disease; it was considerably enlarged, and filled with small circumscribed abscesses or vesiculæ containing thick pus, some of which were of the size of a nutmeg, and had orifices of communication with the infundibula and pelvis. These latter were dilated to twice their natural capacity, and the ureter was so large as to admit the end of the forefinger.

“The appearances in the right kidney were similar to those already described in the left.

“The fundus of the bladder was found projecting about half an inch beyond the ossa pubis, tightly embracing a hard body.

“On cutting into the cavity of the bladder, this hard body proved to be an oval compact stone, irregularly covered with a soft chalky substance.

“Its weight was nearly two ounces and three quarters. Near that extremity of the stone which was immediately in contact with the fundus of the bladder, there was a small pointed irregu-

larity, or projection, about the size of a pin's head, which corresponded with an impression, or rather ulceration, in this part of the bladder just large enough to receive it. Around this small ulceration there was a circle about the circumference of a shilling, having the appearance of recent inflammation.

"The coats of the bladder were considerably thickened, and that portion which immediately embraced the stone, forming the fundus, was so indurated and diseased, as to be, I should imagine, incapable of dilatation.

"That space towards the neck of the bladder unoccupied by the stone (the coats being here in a much less diseased, and more dilatable, state) contained an ounce or two of urine, loaded with pus, which seemed to issue from the mouths of the ureters."

Natural cure.] In the third volume of the Memoirs of the Medical Society of London, a very curious case is related of a stone which released itself from the bladder by passing through the rectum. Dr. Johnstone, of Worcester, who relates it, describes the patient to have, for many years, suffered the most excruciating pains from gravel and stones in the bladder; for which he received no relief, but rather aggravation of pain, from the use of the most celebrated lithontriptics. Nor did even the largest doses of opium, whether taken into the stomach, or conveyed by clyster, hardly give him any respite from pain.

"Some years passed in this torture," says Dr. Johnstone: "he began at length, in searching his stools, to find pieces of gravel voided with them. I saw some of these pieces, and was perfectly convinced by their appearance, that they had come from the bladder, and had forced their passage through it and the rectum. Tincture of opium was daily injected in oily clysters to quiet the pain, till these pieces of gravel came away in his stools; and he has ever since been free from the pains which had tormented him for so long a time."

"This kind of *natural lithotomy*, if I may so express myself, is, I believe, not very common; but no one who saw this patient in the least doubted that the stones, which had given such pain in the bladder, had cut their way through the bladder and rectum, and, being discharged with the stools, the wound through which they passed had perfectly healed; for he is now a very healthy and vigorous old man."

Lithotomy.] The only effectual method of removing stones from the bladder is by means of a surgical operation; the success of which depends much upon the dexterity of the surgeon, as well as on the constitution of the patient. When the constitution has been so much impaired that the patient complains greatly of sickness and oppression at stomach, with nausea and an inclination to vomit, especially upon taking food; when he has likewise a constant thirst, and the pulse is as high as a hundred strokes in the

minute; an operation is improper till these symptoms are removed. The operation is improper also when the patient labours under a severe fit of the stone; for then inflammation of the bladder is apt to ensue to such a degree as to produce suppuration. By frequent attacks and continuance of these fits, the coats of the bladder are apt to be thickened and greatly contracted. This last circumstance may be known by the introduction of the sound; for then it will stop after getting past the sphincter of the bladder, and cannot be pushed further without considerable force, and at the same time giving the patient the most exquisite pain. Nor ought the operation to be performed when the bladder is ulcerated, especially where the patient is old, and much debilitated, and where the discharge of matter is great.

Children more readily recover from the operation of lithotomy than adults; and old people from the age of fifty-five to that of seventy, whose constitutions have not been broken, are in less danger than those in the full vigour of life, probably owing to inflammatory symptoms being more apt to proceed to a dangerous length in the extremes of age than at the middle period of life. When the constitution, however, is not much impaired by the continuance of the disease, the operation may be undertaken with a probable degree of success almost at any period of the patient's life.

Several methods have been recommended for performing this operation; but there are only two which can be practised with any propriety. One is, where the operation is to be performed immediately above the pubes, in that part of the bladder which is not covered with peritonæum: the other, where it is done in the perinæum, by laying open the neck and lateral part of the bladder, so as to allow of the extraction of the stone.

High operation.] Franco, a French surgeon, finding a stone in a child of two years of age too large to be extracted through an opening in perinæo (the place where the operation was then performed), was induced to make an incision into the bladder above the pubes; but though the stone was extracted and the child recovered, Franco, who published the case in 1561, never attempted the operation again, and even dissuades others from doing it. It does not appear indeed to have been much practised any-where till some time after the commencement of the present century, about the year 1720, when it was adopted and frequently performed in Britain, and other parts of Europe, for the space of about twelve or fifteen years. The lateral operation came then to be more generally known, and since this period the high operation has been seldom practised.

In performing the high operation, the bladder must be in a distended state, so as to make it rise above the ossa pubis, to allow an incision to be made into that part of it which is uncovered by the peritonæum, and thereby to prevent the abdomen from being

opened or its contents exposed. Some days, or even weeks, previous to the operation, the patient ought to be desired to retain his urine as long as he can, so as to distend the bladder till it can hold at least a pound and a half, when the person is an adult, and of an ordinary size; or the penis may be tied up to allow the urine to collect. As these methods may be attended with great distress, some prefer distending the bladder by injecting warm water by slow degrees till the bladder is sufficiently full, which may be easily known by relaxing the abdominal muscles and feeling above the pubes.

When the operation is to be performed, the patient is to be laid upon a table of convenient height, with the pelvis higher than the shoulders, that the parts may be fully on the stretch, and to prevent the bowels from pressing upon the bladder. The legs and arms are to be properly held by assistants. An incision is to be made through the skin, in the very middle of the under and fore part of the abdomen, from some way under the umbilicus to the symphysis pubis. The cellular substance, the tendon of the oblique muscles, the muscoli recti and pyramidales, are now to be separated; and it is better to make this separation from the pubes upwards, so as to be in no danger of cutting into the abdomen. The surface of the bladder will now appear uncovered by the peritonæum. Then the operator, with a common scalpel, or an abscess lancet, or, what is better, with a concave sharp-pointed knife, makes a perforation into the most prominent part of the bladder, till the fore-finger of the left hand can be introduced. The ligature is now to be removed from the penis; then with a probe-pointed bistoury, making the finger serve as a conductor, the wound is to be made sufficiently large for the extraction of the calculus, taking particular care, however, not to carry the incision so high as to cut the peritonæum. This part of the operation being finished, the stone is to be extracted with the finger; or if that be impracticable, the forceps are to be employed. Should it unfortunately happen that the stone is broken in the extraction, the pieces are to be removed entirely by the fingers rather than by scoops, which are sometimes used. The edges of the wound in the integuments are now to be drawn together by means of the twisted suture, leaving about an inch and a half immediately above the pubes for the discharge of any urine which may be there evacuated. The patient is to be laid in bed, with the pelvis still kept higher than the shoulders.—Gentle laxatives are to be occasionally given, and the antiphlogistic plan strictly adhered to.

The advantages of this method are, that larger stones can be extracted by this than by the lateral operation, and that fistulous sores are less apt to ensue. The disadvantages are, the danger of opening or wounding the peritonæum, and thereby exposing the abdominal bowels; the frequent occurrence of inflammation about the

beginning of the urethra, so as to occasion the urine to be diffused in the cellular substance on the outside of the bladder, and thereby producing sinuses difficult to cure; the extreme difficulty of healing the wound, especially in bad constitutions: and lastly, the small number of patients, after the age of thirty, who have been found to recover from this operation.

Lateral operation.] Frère Jacques, a French priest, was the inventor of the lateral operation. He first appeared at Paris in 1697, and afterwards operated in a great number of cases.

He introduced a sound through the urethra into the bladder with a straight bistoury, cut upon the staff, and carried his incision along the staff into the bladder. He then introduced the fore-finger of the left hand into the bladder, searched for the stone, which, having withdrawn the sound, he extracted by means of forceps. The patient was now carried to bed, and the after-treatment left to the attendants.

Professor Rau, of Holland, improved upon this method, by making a groove in the staff, which enabled him, with greater certainty, to continue his incision into the bladder; but instead of dividing the urethra and prostate gland, the latter of which he was afraid of wounding, he dissected by the side of the gland, till the convex part of the staff was felt in the bladder, where he made his incision, and extracted the stone; but this method was too difficult to perform, and attended with too many inconveniences and dangers ever to be generally received. It suggested, however, to the celebrated Cheselden the lateral method of cutting, as it is now with a few alterations very generally practised. We shall attempt to describe the different steps of this operation in its present improved state.

Preparatory treatment.] The manner of preparing the patient depends upon a variety of circumstances. If he be plethoric, a few ounces of blood should be taken away, and at proper intervals the bowels ought to be emptied by any gentle laxative which will not gripe. The diet should consist of light food for some time previous to the operation. If the pain be violent, opium is necessary. Sometimes it is relieved by keeping the patient in bed with the pelvis raised so as to remove the stone from the neck of the bladder. He ought not to sit up, or take any exercise, in the time of preparation. The warm bath ought to be used two or three times, and the patient should remain in it half an hour at each time. A laxative ought to be given on the day preceding the operation, and an injection a few hours before it is performed. The patient ought to drink plentifully of some diluent liquor, and to retain the urine several hours previous to the operation. If this cannot be readily effected, a slight compression, by means of a ligature, may be made upon the penis, so as to have the bladder sufficiently distended, that there may be no danger of the posterior surface being

hurt by the end of the gorget. The perinæum and parts about the anus should be well shaved.

Improved operation. A table somewhat more than three feet in height, and of sufficient strength, is now to be firmly placed, and properly covered with blankets, pillows, &c. Upon this the patient is to be laid and properly secured; and for this purpose there ought to be two pieces of broad firm tape, each about five feet in length, which are to be doubled and a noose formed upon them. A noose is then to be put upon each wrist, and the patient desired to lay hold of the middle of his foot upon the outside. One end of the ligature is to go round the hand and foot, and the other round the ankle and hand, and cross again so as to repeat the turns in the reverse way. A running knot is then to be tied, by which the hand and foot will be properly secured. The buttocks are then to be made to project an inch or two over the table, and to be raised considerably higher than the shoulders by a couple or more pillows, and one ought to be put under his head.

The operator is now to introduce a grooved staff (fig. 66) of proportionable size, and open to the very end, through the urethra, into the bladder; and having again fully satisfied himself of the existence of a stone, he inclines the staff, if the surgeon be right-handed, obliquely over the right groin, so that the convex part of the staff, may be felt in the perinæum on the left side of the raphe. He then fixes it, and delivers it to his assistant, who is to hold it with his right hand, desiring him to press it gently, in order to make the sulcus of the staff project in the direction in which he received it. With his left hand the same assistant is to raise and support the scrotum.

The thighs of the patient being sufficiently separated by the assistants, and the surgeon being seated upon a chair of a proper height, and in a convenient light, he makes an incision with a common convex-edged scalpel through the skin and cellular substance, immediately below the symphysis of the ossa pubis, which is a little below the scrotum, and where the crus penis and bulb of the urethra meet, and on the left side of the raphe, and continues it in a slanting direction downwards and outwards to the space between the anus and tuberosity of the ischium, ending somewhat lower than the basis of that process, by which a cut will be made of three or four inches in length. This incision ought not to be shorter than is here directed, otherwise there will not be room for the rest of the operation. As soon as the integuments are thus divided, he ought to introduce two of the fingers of the left hand. With one he keeps back the lip of the wound next the raphe, and with the other he presses down the rectum. He ought likewise particularly to guard against cutting the crura of the penis, which he can readily feel, and separate at their under part with one of the fingers. He next makes a second incision almost in

the same direction with the first, but rather nearer to the raphe and anus, by which he preserves the trunk of the arteria pudica. By this incision he divides the transversalis penis, and as much of the levator ani and cellular substance within these as will make the prostate gland perceptible to the finger. If any considerable vessel be cut, it is immediately to be secured, though this is seldom necessary. After this he will have a view of the membranous part of the urethra, which is distinguished from that covered by the bulb by being very thin. He is now to search for the groove of the staff with the fore-finger of his left hand, the point of which he presses along from the bulb of the urethra to the prostate gland, which surrounds the neck of the bladder. He keeps it there; and turning the edge of the knife upwards, he cuts upon the groove of the staff, and freely divides the membranous part of the urethra, from the prostate gland to the bulb of the urethra, till the staff can be felt perfectly bare, and that there is room to admit the point of the finger; and as the finger assists in keeping the parts stretched, and effectually prevents the rectum from being hurt, the incision into the urethra may be made with perfect ease and safety.

The next part of the operation, viz. dividing the prostate gland and neck of the bladder, might, by a dexterous operator, be safely performed with a common scalpel, with the edge turned the opposite way. But to guard against accidents, a more convenient instrument, called the *cutting gorget* (fig. 67), is now in general use. It was originally invented by Mr. Hawkins of London, and since his time has undergone various alterations. Fig. 68 is a double gorget invented by Dr. Monro. The inner plate, which is blunt, is made to slip forwards to protect the back part of the bladder. The membranous part of the urethra being now divided, and the fore-finger still retained in its place, the point of the gorget, previously fitted to the groove, is to be directed along the nail of the finger, which will serve to conduct it into the groove of the staff; and as this is one of the nicest parts of the operation, the most particular attention is here required that the point of the gorget be distinctly heard to rub in the bare groove, and that nothing is interposed.

In the introduction of the gorget into the bladder, if the assistant could be depended upon, the staff might be allowed to remain in his hand: the operator, however, generally chooses to manage it himself. He now rises from his seat, takes the staff from the assistant, raises it to near a right angle, and presses the concave part against the symphysis of the ossa pubes; satisfies himself again that the point or beak is in the groove, and then pushes on the gorget, following the direction of the groove till the beak slip from the point of the staff into the bladder. The gorget is not to be pushed further than this, otherwise it may wound the opposite side of the bladder, &c.

The gorget having now entered the bladder, which is readily known by the discharge of urine from the wound, the staff is to be withdrawn, and the finger introduced along the gorget to search for the stone, which, when felt, will point out the direction to be given to the forceps; at any rate the introduction of the finger serves to dilate the wound in the bladder; and this being done, a pair of forceps (fig. 69) of a proper size, and with their blades as nearly together as their form will allow, are to be introduced, and the gorget withdrawn slowly, and in the same direction in which it entered, so as to prevent it from injuring the parts in its return. After the forceps are introduced, and passed till they meet with a gentle resistance, but no further, the handles ought to be depressed till they are somewhat in an horizontal direction, as this will most correspond with the fundus of the bladder. One blade of the forceps is to be turned towards the symphysis of the pubes to defend the soft parts there, the other of consequence guards the return. After they have distinctly touched the stone, by moving them a little in various directions, they are then to be opened, and the stone laid hold of, which may generally be done with considerable ease. It frequently happens, however, that when the stone is small, it is not readily felt with the forceps; and instances may happen where the under and back part of the bladder may be so depressed as to conceal the stone. In such a situation, nothing will more readily bring it in the way of the forceps than to introduce the finger into the rectum, and elevate this part of the bladder. Straight forceps are generally used; crooked ones, in some very rare cases, however, may be necessary, and therefore the surgeon ought to be provided with them.

After the forceps has laid hold of the stone, if it be small and properly placed, it may readily be extracted; but if, on the contrary, the handles of the forceps are now observed to be greatly expanded, it is certain the stone is improperly fixed, or that it is remarkably large: in either case it should not be held fast, but allowed to move into the most favourable situation; or the finger is then to be introduced so as to place it properly for extraction. If this cannot be done with the finger, it ought to be allowed to slip out of the forceps, in order to get it more properly fixed; and as the most common form of the stone is flat and oval, or somewhat like a flattened egg, the forceps should have hold of the smallest diameter, while an end presents to the neck of the instrument. The stone should be grasped with no greater firmness than is merely sufficient to bring it fairly out. It should be extracted in a slow and gradual manner.

When a stone is broken in the bladder, all the larger pieces are to be extracted by the forceps, which are to be introduced by means of the finger serving as a director. The smaller parts are to be removed by means of a scoop (fig. 70), or probably the finger may

be more convenient; and as the least particle allowed to remain, or which is not washed off by the urine, may serve as the nucleus of another stone, a large quantity of water, properly warmed, is to be injected by a bag and pipe, or by a syringe, and for this purpose the body of the patient should approach at least to an upright posture; and to give the particles of stone an opportunity of collecting near the incision of the bladder, the wound may be stopped for a while after the injection is thrown in.

When a stone is extracted of a regular, firm, and rough surface, it seldom happens that any others remain in the bladder. On the contrary, when it is of an irregular shape, and smooth and polished, particularly in certain places, with impressions formed upon it, there is the greatest probability of others remaining. There are exceptions, however, to these rules; and therefore the operator, instead of trusting to them, should introduce his finger, which will answer the purpose without any other searcher.

Subsequent treatment.] If, after the operation, any considerable artery bleeds much, it is to be taken up with a ligature; but if this be impracticable, the hemorrhagy ought to be stopped by means of pressure, and for this purpose a firm roller introduced at the wound answers sufficiently: and to prevent any stoppage to the discharge of urine, a silver canula, covered with caddice, and dusted over with styptic powder, may be introduced into the wound with advantage.

Sometimes it happens that a considerable quantity of blood, instead of passing off by the wound, is collected in the cavity of the bladder, and may produce very dangerous symptoms. To prevent this as much as possible, immediately upon the operation being finished, the patient's pelvis should be placed considerably lower than the rest of his body; by which means the wound will be kept in a depending posture, and the blood will escape more readily by the wound. But if it be found that blood is still lodged in the cavity of the bladder, it must be immediately extracted.

As soon as the bleeding is stopped, the patient is to be untied, a piece of dry soft charpie put upon the lips of the wound, and often renewed, and the thighs brought together. He is then to be laid in a bed, in such a way that the pelvis may be considerable lower than the rest of the body, to give a favourable direction to any blood which may afterwards flow from the wound. A considerable dose of laudanum is now to be given. From thirty to fifty drops for an adult will commonly be necessary. From this period, unless the stone has been large and difficult to extract, the patient commonly falls asleep, or at least lies quiet for a few hours; but afterwards generally begins to complain of pain in the under part of the abdomen. Anodynes are now to be given both by the mouth and anus, and warm fomentations, by means of flannels, or bladders filled with warm water, are to be applied to the region of the bladder, as the affection seems to be of the spasmodic kind.

If by a continuance of these remedies the pain abates, no anxiety need be entertained concerning it; but if it increase, and especially if the abdomen become hard and swelled, and the pulse full and quick, and these symptoms become gradually worse, great danger is to be apprehended, as they most commonly take place in consequence of inflammation. In this situation, as much blood ought to be taken as the patient can bear. A large injection of warm water and oil, or linseed tea, should be given every six or seven hours, and the fomentations continued at the abdomen. If the symptoms continue to grow worse, the patient should be immediately put into the semicupium or warm bath.

By a proper continuance of these means, with a low diet and plenty of diluent drink, the above symptoms may frequently be removed. The reverse, however, is sometimes the case. The wound becomes sloughy and ill-conditioned; all the symptoms, in spite of every effort, continue to increase, and soon terminate in death.

But where matters end favourably, the wound by degrees puts on a better appearance; the urine passes almost from the beginning by the urethra (most frequently, however, it is discharged by the wound for the first two or three weeks); the pain in the abdomen gradually abates, the feverish symptoms are soon removed, a complete cicatrix is formed, and the wound is sometimes cured in a month; though upon other occasions three will be necessary. But it must depend greatly on the nature of the constitution.

Excoriation of the buttocks may be prevented by placing a sheet under them several times doubled, the breadth to be eighteen or twenty inches, and to be all rolled up, except the part which is to be laid under the patient, the rest of the roll to be by his side, which is to be unrolled as the nurse draws the wet part from under him. If, after the use of this, excoriations should still happen, the part may be washed with cold water; or the parts round the wound, after being well dried, may be rubbed with any simple ointment.

In patients of a debilitated constitution, incontinence of urine frequently occurs after this operation. In general, this is removed as the patient acquires strength. Nourishing diet, cold bath, the bark, and other tonics, are of much service here; but where these are afterwards found ineffectual, instruments for compressing the penis, or others for receiving the urine, have been found useful, and are now made in such a convenient way as to allow them to be constantly used so long as they may be found necessary.

Lithotomy in females.] An operation for stone in the bladder is much seldomer required in women than in men, on account of the shortness of the urethra in the former allowing a readier passage for the small calculi which get into it, or are formed in the bladder. It is likewise in women more simple, and of course more readily performed. It might be done in the same manner as in the male, but there would be the greatest probability of wounding the

vagina. In a few cases the operation has been performed from the vagina itself; but it is by no means advisable, as stones would not only be extracted with greater difficulty, but, on account of the thinness of the parts, the urine would most probably form a fistulous opening, and a communication be maintained between the bladder and vagina; or cicatrices here might be attended with great inconvenience in child-birth.

In the method commonly practised, the patient being placed and secured in the same manner as in the operation upon the male, the operator introduces a short grooved staff, slightly curved (fig. 71) into the bladder; then by means of the common gorget already mentioned, with its point passed along the groove of the staff, he lays open the whole of the urethra and the neck of the bladder. The staff is now to be removed, the finger introduced upon the gorget to feel for the stone, which is to be removed as already directed for the operation on the male subject. Where incontinence of urine occurs after the wound is healed, a pessary is to be used within the vagina, or a sponge applied, or a tin machine to receive the urine.

SECT. III. *Of STONES in the KIDNEYS.*

The symptoms of stone in the kidneys are, pain in the region of the kidneys, sickness, and vomiting, the urine sometimes mixed with blood, at other times with mucus, or even purulent matter; but the same symptoms are often induced by other causes, especially from inflammation and suppuration of the kidney. Nephritic complaints have frequently subsisted for a long time, where stones have been blamed as being the cause of them; and yet upon dissection purulent matter alone has been detected. From this circumstance, as well as from the great depth of the parts, and the large size of the blood-vessels of the kidneys, the operation of nephrotomy could not be performed, but with the greatest uncertainty and most imminent danger, and is therefore never attempted. A few cases indeed have appeared, where inflammation, induced by a stone in the kidney, terminated in abscess, and the stones were taken out; but it was not till they had worked their way out of the kidneys into the cellular substance, so that it only remained to open the abscess and extract them; but otherwise the operation is never to be thought of.

SECT. IV. *Of STONES in the URETHRA.*

Those who are troubled with calculous complaints frequently pass small stones along with their urine: and when these are angular or of considerable size, they sometimes stick, and give much uneasiness. The symptoms are at first pain, then inflammation and swelling, attended with a partial, or a total suppression of urine, which, if long neglected, is apt to terminate in a rupture of the urethra,

when the urine will be discharged into the neighbouring parts. The greatest attention is therefore necessary to get the stone extracted as soon as possible.

When a stone is in the urethra, unless it be of a large size, or has been long impacted, and the inflammation great, attempts ought to be made with the fingers to push it out; but previous to this, the penis should be relaxed as much as possible, so as to remove a certain degree of spasm which the presence of stone here probably creates. Blood ought to be drawn by general or local means, according as the patient may be of a plethoric or emaciated habit. He should be immersed in a warm bath, and get a full dose of laudanum, and warm oil ought also to be thrown into the urethra. After these remedies have relaxed the parts as much as may be, the extraction is to be attempted.

For this purpose certain instruments have been contrived, particularly a tube containing a pair of elastic forceps (fig. 72), to be introduced into the urethra so as to lay hold of the stone. In some cases they certainly might answer the purpose, but they have not been found very useful; and as they may increase the irritation already present in the urethra, they are seldom, if ever, employed. Instead of them, the surgeon uses gentle pressure on the penis to push the stone outwards; and as calculi larger than a field bean have sometimes been passed by the urethra, an operation ought not to be performed till gentle means have been persisted in for some time. When these means have failed, an incision ought to be made immediately upon the stone, which is then to be removed by a probe, or with a pair of small forceps. When a stone is lodged near the neck of the bladder, after the patient has been placed and secured in the same manner as for the lateral operation, while an assistant supports the scrotum and penis, the operator introduces a finger, oiled, into the anus, to support the stone in its place, and prevent it from slipping into the bladder. An incision is then to be made, and the stone turned out. The after-treatment will be nearly the same as that after the operation of lithotomy.

When, again, a stone has advanced further in the urethra, the best method is to draw the skin strongly forwards or backwards, and then to cut upon it and turn it out, when the skin will slide back so as to cover the wound, and prevent the urine from passing through it; and by this means it will generally heal by the first intention. If part of the urine pass through the wound, and insinuate into the cellular substance, an attempt is to be made with the hand to press it back. If that prove insufficient, a cut is to be made through the skin opposite to the incision of the urethra; but this will seldom be found necessary. If a stone is fixed near the point of the urethra, it may be removed with a pair of forceps; for if this fail, the urethra is to be dilated with a scalpel; and if this also be insufficient, an incision is to be made as above directed. When

he cure is nearly completed, a tube formed of silver or elastic gum, or a hollow bougie, may be used to keep the urethra of a proper size.

The worst part of the urethra for a stone to stick in, is that immediately behind the scrotum; for then the urine is apt to pass by the incision into the cellular substance of the scrotum, so as to occasion large swellings there. To prevent this, a stone so situated ought, if possible, to be pushed forwards with the fingers; or if this be impracticable, it should be pushed back into the perinæum by means of a staff. If both methods fail, a cut is to be made at the under part of the scrotum, which is to be well supported, and at one side of the septum, and continued upwards till the stone is felt, when an incision is to be made into the urethra, and the stone extracted as before directed.

CHAP. XXVIII. OF INCONTINENCE AND SUPPRESSION OF URINE.

INCONTINENCE of urine may arise from various causes, as from a loss of power in the sphincter of the bladder, while the natural tone of that organ remains unimpaired; or from irritation about the neck of the bladder, produced by the friction of stones contained in it; or from a laceration of parts by the operation of lithotomy; or from the pressure of the uterus in a state of pregnancy.

When the disease is owing to a want of tone in the sphincter, the cure is very difficult, because the constitution in general is frequently affected. The most useful remedies are tonics, especially Peruvian bark, chalybeate waters, and the cold bath, both generally and locally applied. Cold substances applied to the perinæum are perhaps of greater service than any thing else, as cloths wet with vinegar and cold water, or with a strong solution of muriated ammonia in vinegar; but the best method of applying cold is to dash water immediately from the fountain upon the anus and perinæum. When it arises from the irritation of stones in the bladder, opiates and mucilaginous liquors plentifully used frequently give great relief. When incontinence of urine is owing to a laceration of parts in performing the operation of lithotomy, the disease is nearly of the same nature as that from the cause first mentioned, and therefore the same remedies are of service. When these remedies fail in either of the cases, compression of the urethra prevents any inconvenience arising from the constant dripping of the urine; and for this purpose an instrument termed *jugum penis* (plate III. fig. 73) is applied to the penis; or, to press against the urethra of the female, pessaries (fig. 74) are contrived, which are made in such a way as to be introduced into the vagina, and there

to press upon the urethra. They are sometimes made of sponge, but those of cork or box-wood well polished are more generally preferred. For a male a ring of elastic gum, or, for a female, a small bottle made of the same, and open at both ends for the passage of the menstrual discharge, answer the purpose still better. Certain cases however occur where pressure upon the urethra is improper, especially where there is a constant desire to pass water; and here much relief is obtained from the use of receivers, or *urinals*, which are now suited to both sexes.

We shall here treat only of that species of suppression of urine where the urine is collected in the bladder, but from some obstructing cause is prevented from being discharged. It arises from a variety of causes.

1. When it arises from a *want of tone* in the body of the bladder, it is often connected with palsy of the lower extremities: it is frequently owing also to retaining urine too long. The catheter, in this case, is commonly an effectual remedy, and ought to be employed as soon as the suppression is evidently formed, and repeated from time to time, till the tone of the system is recovered by the use of proper remedies. The method of introducing the catheter is the same with that already directed for sounding for the stone. Fig. 75 is a catheter for the male, fig. 76 one for the female.

2. When the affection arises from *spasm* about the neck of the bladder, opiates, warm water thrown into the rectum, and afterwards the warm bath, are the best means of producing relief. When it proceeds from the scirrhus of the prostate gland, or from other tumors, or from obstructions of the urethra in consequence of gonorrhœa, the treatment to be afterwards described will be found best suited for such complaints. When the suppression arises from the pressure of the uterus in the latter months of pregnancy, change of posture is sometimes found to have some effect; but if this fail, immediate relief can commonly be given by the introduction of the catheter, which in women is for the most part readily done.

3. Suppression of urine from *inflammation affecting the neck of the bladder* is one of the most alarming varieties of the disease, as it produces pain, and such a degree of swelling in the parts as to render the introduction of the catheter impracticable. It may arise from the matter in gonorrhœa passing backwards along the course of the urethra. An improper use of injections has likewise frequently produced this species of the disease. The treatment is nearly the same as for inflammatory complaints in other parts of the body. Blood-letting should be employed, and particularly leeches should be applied to the perinæum. Opiates ought to be given in large doses. Injections of warm water should be frequently thrown up the rectum, and the whole body should be im-

mersed in the warm bath. If these means be properly used, they will very seldom fail of success; but when they do not prove effectual, when the bladder becomes painfully distended, and when every attempt to introduce the catheter has failed, nothing is to be depended upon but a puncture made into the body of the bladder, in order to discharge the water contained in it.

Various methods have been proposed for effecting this operation. *Puncturing the bladder* above the pubes has been recommended by many respectable authors. Mr. Home, in an excellent paper on this subject, published in 1799, describes three situations, in which this operation is performed; viz. in the perinæum, above the pubis, and through the rectum. "There are," says he, "cases published, giving an account of the event of each of these different modes; but in an operation of such rare occurrence, no author that I have met with has given, from his own observation, successful cases of the different operations, explaining the symptoms, so as to allow of their being compared together, and the advantages and disadvantages of each fairly appreciated."

In the year 1788, Mr. Home assisted the late Mr. Hunter in performing this operation above the pubis, in a case which terminated favourably, and himself, in 1799, performed it in two instances through the rectum with equal success. He therefore states the particulars of these cases in the following way:

CASE I. "A gentleman, thirty years of age, had laboured under symptoms of stricture in the urethra for nine years, and had been occasionally attacked with fits of strangury; these attacks were relieved by introducing a bougie, which instrument was used only on such occasions.

"In January, 1788, one of these fits of strangury came on; during the first two or three days his urine passed only by drops, but at last there was a total stoppage of it. This alarmed the attending surgeon, and after the suppression had continued for twenty-four hours, Mr. Hunter was sent for at twelve o'clock at night to perform some operation to empty the bladder. The state of the patient having been mentioned along with the message, Mr. Hunter desired me to accompany him, and to carry different instruments, that he might be enabled to act according to the circumstances of the case.

"When we were introduced to the patient," says Mr. Home, "he had sickness, with retching, and a slight hiccup; no instrument could be passed by any effort into the bladder, although repeated attempts were made for that purpose; it therefore appeared to Mr. Hunter, that no time was to be lost in relieving the bladder. On examining the belly, the tumor extended as high as the navel, and the parts were fore to the touch: by introducing a finger into the rectum, the bladder was felt to press backward into the hollow of the sacrum.

" In considering the best situation for puncturing the bladder, Mr. Hunter would have preferred the perinæum, and would have performed the operation in the manner recommended in his Treatise on the Venereal Disease, that he might have emptied the bladder and removed the stricture at the same time; but in the night he thought the circumstances unfavourable for so delicate an operation; he was unwilling to make the puncture through the rectum, from an idea that the orifice could not be continued open till the stricture was removed; he therefore determined to make the puncture above the pubis.

" In performing the operation, he felt for the os pubis as a guide, choosing to be as near it as possible, that he might avoid entering the cavity of the peritonæum; but the parts were so distended, that he could not feel the bone, and was therefore obliged to guess at its situation.

" He first made an opening through the skin with a lancet, and then passed the trochar perpendicularly down into the bladder. Upon withdrawing the trochar, the urine rushed out with violence through the canula; a flexible gum catheter was then introduced, and the canula of the trochar withdrawn over it; the catheter was retained in its place by tying it to a bandage passed round the body directly above the opening.

" In consequence of the distension of the bladder, and the opening into it, there was a good deal of pain in the abdomen, foreness when the external parts were pressed, heat on the skin, and frequency of the pulse, which led to a suspicion of there being an inflammation of the peritonæum. Leeches were twice applied to the abdomen, fomentations were used, and an application of spirits kept almost constantly upon the belly; saline draughts, gently opening medicines, and anodyne clysters, were occasionally had recourse to. These symptoms subsided, and the urine came principally and freely by the side of the instrument.

" The next object was to *dilate the stricture*; this was attempted by the bougie; bougies of a small size sometimes seemed to pass, but there was no proof of their having really done so.

" About a fortnight after the operation, the cellular membrane appeared at the orifice of the wound, like wet lint; a swelling was perceived on each side, extending to the spine of the os ilium, in which there was an evident fluctuation; this arose from the formation of matter in consequence of the urine having insinuated itself into the cellular membrane.

" After persevering with the bougie for three weeks without making any progress, the caustic was used; when it had been applied twice, a small silver sound was passed, which found its way into the bladder. This was kept in the urethra for six days, and when it was withdrawn, one of a larger size was passed, and retained there for five days. Some of the water now passed by the

urethra at the side of the sound, but with great pain. In five weeks from the time of the operation, the patient was evidently beginning to sink; had a wild desponding stare, and all the common symptoms of hectic fever; it therefore appeared absolutely necessary to remove the catheter from the artificial opening in the bladder as soon as it could be done with safety. The silver sound was taken out of the urethra, and an attempt was made to pass a flexible gum catheter, which fortunately found its way into the bladder.

“ The moment this was accomplished, the catheter, which had remained in the bladder forty days, was withdrawn from the opening above the pubis, and it brought along with it a quantity of cellular membrane in the state of slough; this was followed by near a pint of matter.

“ From this time the patient began to mend in his health; in a few days the orifice of the wound was almost closed, little of the urine coming that way, as the greater part was regularly drawn off by the catheter in the urethra. In six days the catheter was taken out; upon withdrawing it, the surface was found incruusted with calculous matter, so as to hurt the parts as it passed along the canal, and another was immediately introduced.

“ About this time the wound above the pubis healed up, but very soon broke out again, and discharged a quantity of matter without urine, which led to the belief that the orifice in the bladder was healed. He was now allowed to sit upon a couch, and eat whatever agreed with him.

“ After the second catheter had remained in the urethra six days it was withdrawn, and was found incruusted as much as the former; another was immediately introduced. The wound above the pubis healed a second time: at the end of four days the third catheter was withdrawn, and the parts left to themselves; in four hours after the catheter had been taken out, the patient had an inclination to make water, which he did with great freedom; this was at the end of the eighth week, and he continued to do so for several days, when the wound above the pubis broke out again and discharged matter, and afterwards urine. In three days the orifice of the wound began again to contract, the urine passed more freely by the urethra, and the wound once more healed. Matter collected again on each side of the abdomen, and there was discharged externally a quantity of foetid matter. After some days a fresh opening took place on the right side, giving a free vent to the matter lodged there; the original wound now healed entirely, but another abscess formed near the groin; this broke and discharged freely; both these openings healed in a short time, and in thirteen weeks from the time of the operation, the parts were all consolidated.”

The patient continued well, and made water freely when this account was drawn up, eleven years after the operation.

Mr. Home next relates some cases of suppression of urine in which the bladder was punctured through the rectum.

CASE II. "A gentleman, forty-six years of age, twenty-five years ago, had a gonorrhœa; the inflammatory symptoms of which were removed in six weeks, but the discharge continued above a year. This led him to consult different practitioners, who employed a variety of injections to get rid of it; after the use of these, there was a greater frequency in making water than he had before experienced, and an uneasy feel along the urethra, particularly near the bladder. These symptoms continued, and rather increased for six years, when a new symptom came on, which was an occasional want of power to make water, lasting a few seconds and then going off.

"These stranguries increased gradually in frequency and duration, and in eighteen years they had rendered the bladder so irritable, that it never retained more than three ounces of water at a time, and very often not half that quantity. The patient's mind was kept in a constant state of apprehension of a complete stoppage; his general health was much impaired, and the slightest exposure to cold affected his bladder so as to give him incessant calls to make water.

"Under these circumstances," says Mr. Home, "I was consulted; it was found upon examination, that strictures in the urethra had brought on the present symptoms. For the removal of these he put himself under my care, and that he might have every necessary assistance, took lodgings near me.

"The first stricture met with was four inches and a half from the external orifice. On the 25th of June, I applied a bougie, armed with the *argentum nitratum*, to this stricture, which gave him considerable local pain, but the application relieved the irritation in the bladder, and he made water more freely than before; the same treatment was used every other day, and three applications were found sufficient to open this part of the canal.

"There was a second stricture at six inches from the external orifice; to this the armed bougie was applied on the first of July, and in a few hours one of his usual attacks of irritation came on, with ineffectual straining to make water; this was relieved by passing a small bougie into the bladder, which however could not be done till after several ineffectual trials.

"July 2d, in the evening, the irritation returned with greater violence, and was very severe; no bougie could be passed, and a starch clyster, with thirty drops of tincture of opium, was thrown up; this was not retained, and the irritation increased. Upon a second trial, at eleven o'clock, a small bougie passed, and he discharged about two ounces of urine in a small stream, which re-

lieved him. In an hour the irritation returned, attended with a slight degree of delirium, great thirst, restlessness, and anxiety. At one o'clock in the morning no water had passed, and a bougie could not be introduced; an opiate clyster was thrown up, containing forty drops of tincture of opium; in half an hour another was administered with sixty drops, but the general irritation and painful sensations increased, and thirty drops of tincture of opium were given by the mouth. In this state the patient, in a fit of despair, got a bottle of tincture of opium, and while the nurse went into the next room, took, at two different times, 180 drops; so that in the space of an hour and a half he had taken 210, besides what was contained in the clysters.

" This increased his delirium; at ten o'clock in the forenoon he was put into the warm bath, and after coming out, a small cat-gut bougie passed into the bladder, and brought off about two ounces of water; this relieved him very much. He passed no water during the rest of the day, and the warm bath was repeated in the evening; in the course of the night he passed nearly a pint of water, about two ounces at a time.

" July 4th, he took an opening draught, which procured him two or three motions. In the course of the day he voided a good deal of urine in small quantities, with straining and much pain. These symptoms were aggravated by the piles, to which he had been accustomed, and which were now forced out, and were very large; they were punctured, and bled freely, which diminished their size, but did not lessen the pain.

" July 5th. Passed his urine with tolerable ease through the day in small quantities, but a suppression came on in the night, and at four in the morning he was in such a state of irritation as to give an alarm of his losing his senses. In this state he expressed the most anxious desire, that an opening might be made to empty the bladder; and his sufferings for the last three days had been so great, that I thought myself justified in complying with his request.

" The instrument I made use of was the long curved trocar, recommended by Pouteau, only made flat instead of being cylindrical, which rendered the point better adapted for wounding the bladder, and the flattened form was considered as better fitted for lying without inconvenience in the rectum.

" This instrument I have had by me for many years. I passed my finger up the rectum and felt the bladder, which was less prominent than it was reasonable to expect; upon this finger I introduced the instrument with the point concealed in the canula, up to the part which I intended to puncture, then pushed the instrument into the bladder. On withdrawing the piercer, the urine flowed freely through the canula; the quantity evacuated was only four ounces, but as the bladder for many years had not retained

more than three ounces, this was a large quantity in the present irritated state of that viscus.

" The operation was performed on the 6th of July, at half past four in the morning; the wounding of the bladder gave him no sensible pain, and he felt very easy the moment the urine was evacuated. The canula was confined in the rectum by a bandage.

" As it was intended that the wound in the rectum should be kept open till the stricture was removed, the canula was retained in the bladder till the edges of the wound should be consolidated by inflammation; after which, the urine passing through the fistula, would prevent its closing till that fluid was conducted by another channel.

" The urine was passed through it involuntarily, but did not flow constantly; and when it was forced out he felt a pain in the glans penis. He slept in the course of the forenoon more than he had done for two or three days, and was tranquil and comfortable; his mind was also at ease by having lost the dread of a stoppage, which before affected him nearly as much as the reality.

" In the evening he took three ounces of *mistura camphorata*, with thirty drops of tincture of opium. In the night, the same quantity of that mixture was given, with twenty drops of tincture of opium, in consequence of the pain and irritation experienced when the urine was forced out by the action of the bladder.

" July 7th. The urine was passed at longer intervals, but the straining at these times was great, and attended with pain; it felt to him that some drops lodged at the neck of the bladder, and he could not resist the inclination of making an effort to discharge them. The same opiate draught was repeated at night, but did not prevent him from being very restless.

" 8th. He took an opening draught, which operated and relieved him very much; there was no inconvenience from the instrument lying in the rectum. The intervals between the times of making water were longer than usual; the opiate draught was repeated at night; he slept a good deal, and was much refreshed.

" 10th. The armed bougie was applied a second time to the stricture, after which he had less irritation in the urethra at the time of the water passing through the rectum.

" 11th. The irritation in the bladder was considerable, and the urine did not pass readily through the canula, which induced me to remove it, as it had remained there five days. The sides of the wound between the bladder and the rectum were considered to have had sufficient time to be consolidated by inflammation, to prevent the urine from insinuating itself into the cellular membrane. Upon removing the canula the irritation subsided, and he slept well in the night with the usual opiate.

" 21th. The second stricture was found to be removed, and the armed bougie was applied to a third stricture, about seven inches

and a half from the external orifice. The urine was passed at regular intervals of half an hour through the wound without uneasiness. The usual opiate was repeated at night; he slept well, and a few drops of water passed by the urethra.

" 14th. Towards the afternoon he had a violent attack of irritation and constant inclination to make water, which came away with great uneasiness. He took thirty drops of tincture of opium, which made these symptoms subside. After this three ounces of urine passed at one time, by the urethra, without pain, and the same quantity continued to pass once an hour. He had a very comfortable night,

" 15th. The armed bougie was applied a second time to the third stricture; it gave a great deal of local pain, which lasted for an hour; his water passed easily through the day; the opiate draught was repeated, and he slept tolerably well.

" 16th. The opening medicine was repeated, and he had no irritation in the bladder during the day; in the afternoon the greater part of the urine passed by the rectum, a small proportion by the urethra; the opiate draught was repeated, and his night passed very quietly.

" 17th. The armed bougie was applied a third time to the third stricture, and the water passed entirely by the urethra without much pain or straining; the night draught was repeated, and he had a quiet night.

" 18th. About two o'clock in the day he voided some blood through the penis, and also by the rectum, with a large piece of slough, and was very easy the rest of the day; the opiate draught was repeated, and he had a good night.

" 19th. The urine passed entirely through the rectum; he had a good night without the opiate draught.

" 20th. The armed bougie was a fourth time applied to the third stricture; the local pain was very severe, and there was a small discharge of blood; the pain lasted near two hours, but he had no inclination to make water for six hours; the water passed by the rectum without any straining, and he did not again make any water for six hours.

" 21st. About six o'clock in the morning, an irritation to make water came on, and returned at short intervals; the urine passed through the urethra mixed with blood; this went off in the course of the day.

" 23d. The unarmed bougie, which was used preparatory to introducing the armed one, passed into the bladder; the water came principally by the urethra, but with irritation and pain in the glans penis. He was restless in the fore part of the night, with irritation to make water, and took an opiate, which relieved him.

" 27th. His urine passed by the rectum till the middle of the day, when a large slough came away by the penis, and immediately after it half a pint of urine in a full stream. This slough

was probably that separated from the wound in the bladder, which had fallen into the cavity. In four hours he made nearly the same quantity of water at one time.

"No water had passed by the rectum after the 27th, nor was it voided oftener than once in four or five hours; so that in three weeks from the time of the operation, the strictures in the urethra were removed, and the orifice in the bladder no longer gave a passage to the urine.

"On the 31st he went out airing for the first time, his strength and appetite being much improved.

"August 2d. The unarmed bougie was passed to ascertain that the urethra continued free from stricture, and went more freely into the bladder than before.

"12th. He was so well in every respect, that he went to the sea to bathe for the benefit of his general health."

Mr. Home further observes, that the wound through the rectum continued open for three weeks, the time that was required to remove the obstruction, but that it healed up as soon as there was a free passage for the urine through the natural canal.

CASE III. "A gentleman, aged thirty-two, when fifteen years old, had a gonorrhœa, which, from great inattention in the patient, and from the use of irritating injections, did not subside in the usual time. The irritation extended itself along the urethra to the bladder, and brought on frequency of making water, attended with straining and occasional strangury.

"These symptoms never went entirely away; they were at times more severe, at others less so; and there were intervals of months in which he only made water once in four or five hours; these however were rare, and in general the bladder could not retain more than three or four ounces of water at any one time.

"There was this peculiarity in the case, that when the urine stopped, it produced a swelling behind the scrotum; when this was pressed, some mucus came away, and was followed by urine; these occasional stranguries sometimes lasted seven or eight hours before they went off. He had recourse to the common bougie, but none could be made to pass into the bladder; afterwards the use of the caustic was attempted, but the surgeon had not confidence enough in that mode of treatment to induce him to persevere in it, and after a few unsuccessful trials he left it off.

"In August, 1799, his complaints became worse than before; every morning there was a stoppage of urine that lasted several hours, which was with difficulty relieved by opium; under these circumstances he came to London, and put himself under my care.

"As no bougie could be passed into the bladder, and there was reason to believe, from the account of the case, that a sac or bag had formed in the peritonæum behind the stricture, the only chance of giving him relief appeared to be by applying the caustic; and should the slough formed by the application at any time stop the

small orifice of the stricture, an opening must be made into the bladder to relieve the symptoms of suppression, and admit of the prosecution of the cure.

" Under these circumstances I entered upon the treatment of the case, and had the patient in lodgings near me, that every necessary attention might be given which the symptoms required.

" 24th. The armed bougie was applied to a stricture, three inches distant from the external orifice; the pain which this application produced was trifling, and it was not followed by any difficulty in the passing of his urine.

" 26th. The application was repeated to the same stricture.

" 28th. The first stricture was found to have been destroyed by the second application, as the bougie now passed on six inches to a second stricture, to which the armed bougie was applied.

" 30th. The application was repeated to this second stricture, and in the evening the patient was unable to make water, although there had been neither pain nor irritation. An opiate injection, containing forty drops of tincture of opium, was thrown up in the evening; and a draught, containing twenty drops, was taken at twelve o'clock at night, and repeated at two in the morning.

" 31st. At seven o'clock in the morning the bladder was found to be much distended, as he had made no water for sixteen hours; the irritation to make it was very great, and almost constant; and no instrument whatever could be made to pass into the bladder. It was proposed to puncture the bladder, without waiting till the parts were still more irritated, and the patient's strength and spirits more exhausted. This was considered not only as a means of giving relief to the present symptoms, but of enabling us afterwards to prosecute the cure. These reasons induced the patient to give his consent, and the operation was performed exactly in the same manner as in the former case. A pint and a half of urine were drawn off, and the instrument secured in the rectum.

" He felt immediate ease, in an hour fell asleep, and passed the day perfectly tranquil. The urine did not constantly pass out at the canula, although no plug was put into it; the first time of any coming away was at half past ten, three hours and a half after the operation; he made water again at four. His pulse was not quicker than natural, and he had only slight irritation in the urethra.

" The reason why the urine does not constantly issue through the canula is, that its orifice is situated at some distance from that part of the bladder where the ureters open, and its end projects into the cavity like the waste pipe in a cistern, which can have nothing pass through it till the level of the water is raised above its orifice.

" September 1. He slept tolerably well during the night; passed his urine through the canula every four or five hours, in the quantity of nearly four ounces each time, and he had little or no uneasiness in the bladder or urethra.

" Towards the afternoon the canula was obstructed by the mucus from the bladder, which was removed by passing a wire through it; the urine, however, did not flow readily till he got upon his knees, in which posture half a pint came away, and a few drops by the urethra, with exquisite pain.

" In the evening he had a paroxysm of fever, or a fit of an ague, attended by head-ach. A pint of warm water was thrown up as a clyster, which brought away a great deal of wind, and a copious stool. He was afterwards materially relieved. He took fifteen drops of tincture of opium, and had a quiet night.

" 2d. He was easy during the day, and had very little pain in the urethra. The urine did not pass readily by the tube, which occasioned his having a restless night.

" 3d. The armed bougie was applied to the stricture six inches distant from the external orifice, which gave less pain than the former applications. In the afternoon the canula was found to give more uneasiness from not allowing the urine to pass; and as it had been in the bladder three days and a half, it was judged advisable to remove it. This gave great relief, the urine, however, did not afterwards come through the wound, but by the urethra. He took fifteen drops of tincture of opium, and passed a restless night. He made water four times before morning by the urethra, nearly four ounces each time.

" 4th. At six in the morning he took an opening medicine, which operated in four hours, and relieved his uneasiness; he made water during the day every three or four hours, and passed a quiet night, sleeping three hours at a time.

" 5th. The armed bougie was applied; he had no uneasiness during the day, and passed a quiet night.

" 7th. The stricture at six inches was found to be destroyed, and another was met with at seven inches, to which the armed bougie was applied. In the afternoon he made water in a better stream.

" 9th. The armed bougie was again applied to the stricture at seven inches; this brought on a swelling in the perinæum, which lasted several days, but did not impede the passing of the urine, nor did he afterwards experience any attack of strangury, although the last stricture was not destroyed in three months; and the armed bougie was applied every second or third day during the whole of that time.

" In this case the urine never came through the wound in the bladder after the canula was withdrawn, which is to be attributed to its finding a passage by the urethra, and the quantity the bladder held at any one time was insufficient to distend that viscus so much as to reach the wound in it made by the operation.

" In the former case the bladder was less distended, and therefore was wounded near the prostate gland, which is probably the reason why the urine found a more ready passage through the ca-

nula; and when it did, why the bladder was more completely evacuated.

"From this circumstance it would appear that there is an advantage in the puncture being made as near the neck of the bladder as it can be done with safety."

Mr. Home draws the following conclusions respecting the different modes of puncturing the bladder. He says,

"When the puncture is made above the pubis, the canula which incloses the trocar is not to be removed, till the surrounding parts have been consolidated by inflammation, so as to prevent the urine in its passage out from insinuating itself into the neighbouring parts, for wherever the urine lodges, mortification takes place. Any advantage therefore, which may arise from a more flexible instrument remaining in the bladder, is more than counterbalanced by its not filling completely the aperture through the coats of the bladder, and allowing the urine to escape into the cellular membrane.

"When the coats of the bladder are inflamed and irritated to a very great degree, a wound in them is not necessarily productive of any bad consequences; and when these symptoms are brought on by a retention of the urine, all that is requisite for their removal is, not allowing any quantity of water to be accumulated in the bladder.

"When the puncture is made into the bladder through the rectum, it is not necessary to retain the canula in the orifice beyond the time in which inflammation consolidates the sides of the wound, as there is no danger of the aperture closing up, till there is another passage made for the urine.

"The wound in the rectum, whether it has a canula retained in it or not, does not allow the urine to escape, till a sufficient quantity is collected to make the coats of the bladder act for its expulsion; and the quantity necessary for that purpose will vary according to the state of the bladder at the time.

"The bladder, although contracted to a small size by long-continued irritation, almost immediately on being relieved from that irritation, has a power of recovering itself, and allowing of a much greater degree of distension; otherwise the bladder in the second of these cases, which had not for many years retained more than three ounces of water at any one time, could not, in four days after the last stricture was destroyed, have retained half a pint."

The ingenious author throws still further light upon this operation, in a short account of the most material circumstances attending a third case of puncture made in the bladder through the rectum.

CASE IV. A gentleman, forty years of age, had a gonorrhoea in the year 1777, for the cure of which he used an injection; this irritated the urethra so much, as to bring on a suppression of urine almost immediately after its application, which lasted three days, and then went off. He continued tolerably well till 1790, when

the urethra had become so much contracted, as to make the passing his water a very tedious and difficult operation; and he believes, that his bladder was never entirely emptied. By the use of bougies the passage was dilated so as to allow of a tolerable stream of urine, but during their use he had several partial suppressions. In 1796 he was again obliged to return to the use of the bougie, but was unable to pass one of the smallest size into the bladder; and from that time had suffered severely from occasional suppressions, great discharges of mucus, and a constant gleet. His urine, under the most favourable circumstances, only passing in drops.

"In November, 1799," says Mr. Home, "he put himself under my care; the armed bougie was applied to a stricture five inches and a half from the external orifice; this application was repeated seven times, without any irritation being brought on, or an increased difficulty in voiding the urine. This stricture gave way, and the armed bougie was applied to a second at seven inches: the first and second applications to this stricture were attended with no particular symptoms; but after the third, which was on the 24th of November, a complete suppression came on; this lasted eight hours, when, in consequence of having taken fifty drops of tincture of opium by the mouth, and the same quantity in a starch clyster, he made an ounce and a half of water. In the course of the night the pain and uneasiness increased, and the fifty drops of tincture of opium were repeated.

"25th. He made about two ounces of water; a clyster of warm water was thrown up, which relieved his uneasiness, and he passed the night with tolerable ease, and made half a pint of water.

"26th and 27th. He continued in a state of great irritation, occasionally passing small quantities of water and mucus, but never enough at any one time to relieve the bladder.

"28th. The bladder was very much distended, and distinctly felt above the pubis; its outline was even conspicuous to the eye. In this state I proposed performing the operation of puncturing the bladder through the rectum, which was immediately assented to. For the reasons already given, I used the trocar recommended by Pouteau, with a cylindrical canula. Sixteen ounces and a half of urine were discharged through the canula: the patient felt no pain in the operation any-where but in the glans penis, and that was only momentary; it however returned afterwards frequently in the same same part. The canula was left in, and he felt perfectly easy, all his distresses being removed. The urine passed away continually without any effort, or even the patient's knowledge. He had a tolerably quiet night, and slept the latter part of it.

"29th. He complained of distension of the bowels from wind. In the afternoon the urine came away at intervals of half an hour; the verge of the fundament was excoriated by the urine passing through it. He had a very good night till one o'clock, when, attempting to expel some wind downwards, the canula was forced out.

of the bladder, which made him uneasy and restless the remainder of the night.

" 30th. At nine o'clock in the morning, the canula was withdrawn from the rectum; and in the course of the day the urine passed readily through the rectum.

" 30th. The use of the caustic was resumed, the water passing at intervals by the rectum, and a few drops by the urethra; there was an unusual flatulence in the bowels, and great languor and debility.

" These symptoms in a few days subsided.

" Dec. 5th. The urine continued to pass freely through the orifice in the rectum.

" Jan. 6, 1800. Although the last stricture is not yet destroyed, all the distressing symptoms have subsided, and the patient is able to retain his water for six or eight hours at a time.

" When the urethra is perfectly quiet, the water now comes with tolerable freedom through that canal; and when it is disturbed by the application of the armed bougie, the urine finds a passage by the orifice through the rectum, so that I am enabled to prosecute the cure; and judging, from the progress already made, there is no reason to doubt of its being soon completed.

" The cylindrical canula has an advantage in giving a more ready passage to the urine, and leaving an aperture in the bladder, by which it is afterwards more freely discharged; but its form, admitting of being embraced by the sphincter muscle, is unfavourable to the escape of wind, or the other contents of the bowels.

" In this case the air in the rectum having forced out the canula as soon as the inflammation upon the orifice in the bladder had subsided, so as to admit of the canula disengaging itself, affords us a criterion in practice, of the proper time for withdrawing the canula, which may be done in thirty-seven hours, or as soon as suppuration comes upon the wound in the bladder."

When the bladder is to be *punctured from the perinæum*, the trocar, which ought to be longer than the one for puncturing above the pubes, is to be introduced at a little distance from the rapha perinæi, and then passed into the body of the bladder, a little to the upper and outside of the prostate gland, carrying the point of the instrument a little upwards, to avoid wounding the ends of the ureters or feminal vessels. Puncturing from the anus, or the vagina in females, are attended with so many inconveniences that they ought never to be attempted.

CHAP. XXIX. ON THE VENEREAL DISEASE.

SECT. I. *Of the GONORRHOEA.*

I. *Description.*] The first symptoms of this disease in men are commonly a sensation at the end of the penis not unlike a flea-bite,

together with a fulness of the lips of the urethra, and some degree of tension in the penis, the urinary canal feeling as if tightened, and the urine flowing in a small and unequal stream: a little whitish mucus is to be seen about the orifice of the urethra, and oozing from it when lightly pressed, especially if the pressure be made on the spot where the soreness is most felt. The discharge soon increases in quantity, and varies in its colour according to the degree of inflammation. The patient feels a sensation of heat and pain in evacuating his urine, particularly at certain spots of the urethra, and above all towards its orifice; and the involuntary erections to which he is subjected from the stimulus, particularly when warm in bed, occasion a distortion or curvature of the penis, attended with exquisite pain. When the inflammation is violent, the glans appears tumid and transparent, the tension extends through the whole of the penis, the perinæum is affected with swelling and redness, and even the loins, buttocks, and anus, sympathize and afford a very uneasy sensation. Sometimes the prepuce inflames about the end of the penis, and cannot be drawn back, occasioning what is called a *phymosis*; at other times, as in the *paraphymosis*, it remains in an inflamed state below the glans, so that it cannot be drawn forwards; and, if the stricture and inflammation be violent, may terminate in gangrene. Now and then, especially when there is a *phymosis*, we may perceive a hard chord extending along the back of the penis. This is an inflamed lymphatic, and may be considered as a prelude to a bubo. When, however, a bubo does appear, almost universally some ulceration is previously to be discovered about the præputium, or glans penis; which gives ground to presume that some other contagious matter besides that of gonorrhœa may have been applied to the urethra. For it is certain that matter capable of communicating the contagion of gonorrhœa to a female is often copiously applied to the whole glans penis of a male for several days together, without giving either ulceration or bubo.

In mild cases, the seat of the disease is in the urethra, not far from its orifice; but it frequently happens that the virus insinuates itself much higher up, so as to affect Cowper's glands, the prostate, and parts very near to the neck of the bladder.

In the generality of cases, the inflammation goes on increasing for several days, commonly for a week or a fortnight; after which the symptoms begin to abate; and the running, when left to itself, gradually lessens in quantity, and becomes whiter and thicker, till at length it wholly stops. The colour of the mucus, however, is by no means a certain guide in these cases: for in many patients it is of a yellowish, and sometimes of a greenish hue to the very last; but in general it becomes more consistent towards the close of the disease.

In women, the external parts of generation being fewer and more simple, the disease is less complicated than in men. Sometimes the

vagina only is affected; and when this happens, the symptoms are very trifling: but in general it comes on with an itching and sensation of heat as in the other sex; and is attended with inflammation of the nymphæ, inside of the *labiæ*, *clitoris*, *carunculæ myrtiliformes*, the orifice and sometimes the whole of the *meatus urinarius*. Very often the deep-seated glands of the vagina are affected, and it is sometimes difficult to distinguish the discharge of a gonorrhœa from that of the fluor albus.

2. *Causes, &c.*] Many ingenious arguments were, some few years ago, advanced to prove, that the gonorrhœa and the lues venerea are different affections, originating from two distinct species of virus; and this controversy still, perhaps, remains to be decided by future facts. Certain it is, that in nineteen of twenty cases of gonorrhœa, no symptom whatever of syphilis appears; and that the disease readily admits of cure without having recourse to those remedies which are universally requisite for combating the contagion of syphilis. It is by no means wonderful, that, in some cases, both contagions, supposing them different, should be communicated at the same time. Nay, cases are by no means rare, where the contagion of itch, though essentially different from both, has been communicated with either. But as undeniable proof that the contagion in both cases is precisely the same, it has been alleged by some, that the matter of a chancre introduced into the urethra will generate a gonorrhœa, and that the discharge from a gonorrhœa will produce chancre, bubo, and every other symptom of syphilis. On the other hand, however, it is contended, that when experiments of this nature are conducted with the greatest accuracy, the matter of syphilis uniformly produces syphilis, and that of gonorrhœa, gonorrhœa only. Without pretending to decide on which of these experiments the greatest dependence is to be put, we may only observe, that while an almost inconceivable small portion of syphilitic matter applied to the glans penis, from connection with an infected female, infallibly produce syphilis if it be not speedily removed, the matter of gonorrhœa, in every instance of that disease, is applied to the whole surface of the glans penis for many days together without producing almost any bad effect whatever. From this, therefore, there is ground for inferring, either that it is not capable of being absorbed, or if absorbed it is innocent.

But while there have been disputes with regard to the peculiar nature of matter in gonorrhœa, there have also been controversies with respect to the source from whence it is derived. While some suppose it to be principally purulent matter arising from ulcerations, other assert that no such ulceration is ever produced in the urethra by gonorrhœa. They contend, that the increased secretion in these cases is exactly similar to what happens in the catarrh. But the comparison will by no means hold good in every particular; in the latter the whole membrane of the nose is equally irritated; whereas

in gonorrhœa, only particular parts of the urethra seem affected. The disease, in the generality of cases, seldom extends more than half an inch or an inch along that canal, and in many is confined (at least in the beginning) to a small spot near the extremity of the glans. This discharge is produced from that part of the urethra where the pain is felt; and the patient, when he voids his urine, feels no smarting till it reaches the inflamed spot: but as the disorder increases, the inflammation affects a greater number of points, just in the same manner as chancres affect different parts of the glans. It might be supposed that dissection would at once clear up this matter, and put an end to the dispute; but this is far from being the case. Dr. Simmons has seen several urethras opened in persons who had a gonorrhœa at the time of their death: in three of them the surface of the urethra, as in the cases related by Morgagni, appeared for some way down of a slight red colour, and in all of them was covered with mucus; but without any appearance of ulceration, except in two dissections at Paris, in which most of the gentlemen present were convinced that they saw evident marks of it: but Dr. Simmons says that the appearances were to him not sufficiently satisfactory to enable him to decide with certainty on the subject. On the other hand, when we consider that the discharge in a gonorrhœa is sometimes tinged with blood, and that when this happens a little blood-vessel is no doubt ruptured, we can have no reason to doubt that an ulceration may, and sometimes does, happen in these cases; especially as we often observe an excoriation near the orifice of the urethra. It is certain, that wherever there is considerable inflammation, there will be danger of ulceration. Besides, from a neglected or badly-treated gonorrhœa, we often see fistulas *in perinæo*, and other ulcers of the urethra, penetrating through its substance, and affording a passage to the urine. And there can be no doubt that slight ulcerations of this canal often occur, and are afterwards perfectly obliterated, in a similar manner to what happens in the papillæ of the tongue, the tonsils, &c. Such an obliteration will the more readily take place in a part like the urethra, defended with mucus, and not exposed to the air, which is known to have no little effect in hardening a cicatrix.

But whether ulcers take place or not, whether the virus of gonorrhœa be precisely of the same kind with that which gives syphilis, or of a different kind, there is reason from the phenomena of the disease to conclude, that the matter first acts by mixing with the mucus at the extremity of the urethra; and that from thence it is propagated upwards, particularly where the excretories of mucus are most numerous; and that on the parts to which it is applied, it operates as a peculiar irritating cause. The consequences of this irritation will be inflammation and an increased secretion of the mucus; and so far the complaint will be local. In ninety-nine cases of an hundred, a local affection of this kind constitutes the whole of the disease; and

of this inflammation, ulcerations within the urethra, strictures, and other local affections, may be the consequence. But whether a disease of the habit ever takes place, unless when the contagion of syphilis is communicated with that of gonorrhœa, still remains to be determined by future observations and experiments.

Nothing can be more variable than the period at which the disease makes its appearance after infection. Perhaps, at a medium, we may place it between the fourth and fourteenth day; but in some cases it happens within twenty-four hours; and in others, not before the end of five or even seven weeks: neither of these extremes, however, are common.

From what has been said of the manner in which the contagious matter in gonorrhœa acts, and of the influence it exerts on those parts with which it comes in contact, it follows, that the prevention of gonorrhœa must depend on the removal of the contagious matter as soon as that can be done; and where this is either altogether neglected or not properly accomplished, that the cure must depend on counteracting the inflammation which this contagious matter excites, and the consequences which result from it.

The first of these intentions may be most certainly and most easily accomplished by careful lotion of all the parts to which the contagious matter has any chance of being applied. These parts, at least on the first application of the matter, are readily accessible; for even in men there is no reason to believe that it at first penetrates to any extent in the urethra. This washing of the parts should be performed as soon as possible; because then the matter is both most accessible and least involved with mucus; but although washing cannot be accomplished at an early period, it should not be neglected afterwards; for from the disease uniformly commencing, even when it does not appear till a considerable time after the application of the contagious matter, with a peculiar sense of titillation at the external parts, particularly in men at the extremity of the urethra, there is reason to believe that the contagious matter attached to the mucus may remain latent there for a considerable time. For the purpose of washing, with a view to the prevention of this disease, recourse may be had to almost any watery fluid, provided it be not so stimulant as to produce bad effects from injuring the parts. Pure water, properly applied, is perhaps one of the best lotions; but there can be no doubt that its power in removing the contagious matter may be somewhat increased by such additions as render it a more powerful solvent of mucus. With this intention, one of the most powerful additions is the vegetable alkali, either in its mild or caustic state. In the latter state it is the most active, but in the former it is most safe; and the *lixivia purificata* of the Edinburgh Pharmacopœia, to the extent of half a drachm, dissolved in six or eight ounces of water, is one of the best lotions that can be employed. The purpose of removing the contagion may often also be

effectually answered from washing with water impregnated with soap; for there the alkali, though in a caustic state, is prevented from exerting any disagreeable effects, in consequence of its being combined with oily matters.

With the view of preventing gonorrhœa, some advised, that the alkali either in its mild or caustic state properly diluted with water, should be injected into the urethra: and there can be no doubt, that by this means the contagious matter, when it has entered the urethra, may be removed. A removal may also be effected by the injection of a weak solution of corrosive sublimate, which seems to act not by dissolving the mucus but by producing an augmented secretion. But at a very early period of the disease, injections are probably unnecessary; and if it has made any considerable progress, they are dangerous: for from the augmented sensibility of the part, even very gentle ones are apt to excite a high degree of inflammation.

There are practitioners who, supposing that the body possesses powers to expel the virus, and that the disease has a certain period to run through its several stages of progress, acme, and decline, are for leaving the cure to nature; or at least content themselves with assisting her by an antiphlogistic regimen, gentle evacuations, and the like.

That in many cases the disorder admits of a natural cure, there can be no doubt; the increased secretion of mucus carrying off the virus faster than it is formed, till at length the infection is wholly removed: but it is equally certain that, in every case, by the application of suitable remedies to the inflamed parts, we may shorten the duration of the complaint, and abridge the sufferings of the patient, with the same certainty and safety as we are enabled to remove the effects of an ophthalmia, or any other local inflammation, by proper topical applications. General remedies, such as occasional blood-letting, cooling diet, the liberal use of diluting liquors, and mild purges, are by all allowed to be useful, and even necessary. Astruc was of opinion, that in these cases blood-letting ought to be repeated five or six times; and there are still many practitioners who depend much on repeated evacuations of this sort for a removal of the inflammation. But there is, perhaps, not one case in ten in which it is at all requisite; and this small number of cases will consist only of the strong and plethoric; in such, when the chordee is frequent and painful, and the pulse hard and full, the loss of from eight to twelve ounces of blood will be beneficial, but it will be seldom necessary to repeat the operation. The inflammation, in these cases, is kept up by the local stimulus of the virus and the urine; and all that we can expect from venæsection is to moderate the pain, and the frequency of erection. In persons of a delicate habit, and of an irritable fibre, the evacuation will do no good; but if repeated will certainly be liable to do harm.

by increasing irritability, and of course rendering the patient more susceptible of stimulus.

The utility, and even the necessity, of a cooling regimen, are sufficiently obvious; wine and spirituous liquors, spices, a fish-diet, much animal food, and salted and high-seasoned dishes of every sort, will constantly add to the complaint. The patient should eat meat only once a-day, and that sparingly. He should abstain from hot suppers. Milk, mild vegetables, and fruit, should constitute the principal part of his diet while the inflammatory symptoms continue. Every thing that tends to excite the venereal imagination should be studiously avoided; for whatever promotes erection of the penis, will increase the inflammation, and of course add fuel to the disease. For the same reasons, much walking, or riding on horseback, will be hurtful, from the irritation kept up in the perinæum by such means. Violent exercise of any kind, or any thing that is liable to increase the heat and the momentum of the blood, will of course be improper.

The drinking freely of mild, cooling, mucilaginous liquors, such as linseed-tea, orgeat, whey, milk and water, almond emulsion, and the like, will be extremely useful, by diluting the urine, and preventing its salts from stimulating the urethra. When the heat and pain in making water are very considerable, mucilaginous substances are found to have the best effect, particularly the gum tragacanth. It is a common practice to give equal doses of this gum, or gum-arabic and nitre, and to dissolve nitre in the patient's drink, with a view to lessen the inflammation. But in these cases nitre is always improper: it is known to be a powerful diuretic, its chief action being upon the urinary passages; so that the stimulus it occasions will only serve to increase the evil it is intended to alleviate. Cream of tartar, on account of its diuretic quality, will be equally improper. Our view here is not to promote a preternatural flow of urine; for the virus, being insoluble in water, cannot easily be washed away by such means; but our object ought to be to render the urine that is secreted as mild and as little stimulating as possible.

Mild purges, which constitute another material part of the general remedies, are no doubt extremely useful, when exhibited with prudence; but it is well known, that the abuse of purgative medicines in this disease has been productive of numerous evils. Formerly it was a pretty general practice to give a large dose of calomel at bed-time, three or four times a-week; and to work it off next morning with a strong dose of *pil. e colocynth.* or some other drastic purge. This method was persevered in for several weeks; in consequence of which the patient often found himself troubled with an obstinate gleet, and perhaps his constitution materially injured; the effect of such a method being (especially in irritable habits) to weaken the stomach and bowels, and lay the foundation

of hypochondriac complaints. Violent purging, likewise, often occasions strangury, hernia humoralis, and other troublesome symptoms.

The purges employed in these cases should be gentle; such as Rochelle salt, manna, tartarised kali, elect. fennæ, ol. ricini, and the like. They should be given only in a dose sufficient to procure two or three stools, and be repeated only every two or three days. The daily use of the purgative electuaries that are still given by some practitioners, serves only to keep up a continual irritation in the bladder, and of course to prolong the inflammation.

The topical remedies that are used, consist chiefly of different sorts of injections, the ingredients of which are extremely various; but their modes of operation may, in general, be referred to their mucilaginous and sedative, or to their detergent, stimulating, and astringent qualities. In the hands of skilful practitioners, great advantages may, doubtless, be derived from the use of these remedies; but, on the other hand, the improper and unseasonable administration of them may prove a source of irreparable mischief to the patient.

We know that mucilaginous and oily injections will tend to allay the local inflammation; and that a sedative injection, such as a solution of opium, will lessen the irritability of the parts, and of course produce a similar effect; the utility of such applications is, therefore, sufficiently obvious.

A detergent injection, or one that will act upon the mucus of the urethra, increase the discharge of it, wash it away, and with it the venereal virus that is blended with it, can only be used as a prophylactic before the symptoms of infection have made their appearance. But great circumspection is necessary in the use of this kind of injection. If it be too weak, it can be of no efficacy; and if it be too strong, it may prove dangerous to the patient. A suppression of urine has been brought on by the improper use of an injection of this kind. When the symptoms of inflammation have once made their appearance, the stimulus of such an injection must be extremely hazardous. Excoriation of the urethra has but too often been produced by remedies of this sort in the hands of adventurous and unskilful practitioners.

While the inflammation of the urethra continues, every thing that stimulates it must be hurtful. If the injection excites a painful sensation in the urethra, as is but too often the case, it will be liable to produce swelled testicles, difficulty in making water, excoriation, and other effects of increased inflammation: if, by its astringency, the running be checked before the virus that excited the discharge be properly subdued, the patient will be exposed to fresh dangers; and perhaps to a variety of local complaints, such as obstructions in the urethra, and abscesses in *perinæo*, which are well known to be sometimes owing to applications of this sort improperly managed.

When the inflammation has subsided, gently stimulating and astringent injections may be used with safety, and with considerable advantage: for as the inflammation is at first excited by the stimulus of the venereal virus, so when the former begins to lessen, we may be assured that the activity of the latter has abated in proportion; and, in general, when the inflammatory symptoms are entirely removed, it will be found, that the mucus is no longer of an infectious nature, but is merely the effect of an increased secretion, and of relaxation. Mild astringents will therefore serve to brace and strengthen the vessels secreting mucus, and in this way will lessen the discharge, and greatly promote the cure. It is certain, that in the greater number of cases, a gonorrhœa which, if treated by internal remedies alone, would continue for five or six weeks, or longer, may, when judiciously treated with injections, be cured in a fortnight, and very often in less time. The great aim, therefore, of the practitioner ought to be, at first, to make use of such injections only as will tend to lubricate the surface of the urethra, and to counteract and destroy the stimulus of the virus: as the inflammation abates, he may add some gently astringent preparation to a mucilaginous and sedative injection; taking care that its astringency be suited to the state of the disease, and to the irritability of the patient. Amongst a great variety of substances, mercury, in different forms, is one of those that is the most frequently employed in injections. All these mercurial injections have more or less of astringency; and, according to Dr. Simmons, it is solely to this property that we are to ascribe their effects; for the idea of their correcting the venereal virus was originally introduced, and has, he thinks, been continued upon mistaken principles.

Calomel, mixed with the mucus discharged in a gonorrhœa, has no more power in destroying the infectious properties of that mucus than ceruse or any other preparation would have. A diluted solution of sublimate injected into the urethra, will, like a solution of verdigrise, or blue vitriol, or any other styptic, constrict the mouths of the lacunæ; but this is all that it will do, for it will never lessen the infectious nature of the virus. The same thing may be observed of crude mercury, extinguished by means of mucilage, or of mercurial unction, blended with the yolk of an egg, and which, when thrown up into the urethra, will act nearly in the same manner as balsam of copaiva, or any other stimulating injection. The stimulus of calomel, however, has often been found of considerable efficacy; and in women, when the vagina only was affected, after washing the parts well, the cure has been accomplished by rubbing them repeatedly with mercurial ointment.

Having said thus much on the nature and properties of different injections, we shall here offer to the practitioner's choice the following formulæ employed in the London hospitals:

(No. 87.) \mathcal{R} Aluminis gr. iv.

Aquæ rosæ \mathfrak{z} iv. Misce fiat injectio.

In this and other injections for the gonorrhœa, the proportion of active materials is to be varied according to circumstances, especially in women, who will bear much more powerful remedies of this kind than men.

(No. 88.) \mathcal{R} Aquæ ammoniæ acetatæ \mathfrak{z} j.

Aquæ distillatæ \mathfrak{z} iiij. Misce fiat injectio.

(No. 89.) \mathcal{R} Mucilag. sem. cydonii \mathfrak{z} iv.

Calomelanos \mathfrak{z} ss. Misce fiat injectio.

At St. Bartholomew's hospital, an injection of calomel and mucilage of gum-arabic, in the proportions here stated, is employed.

(No. 90.) \mathcal{R} Pulv. cerussæ comp. \mathfrak{g} j.

Zinci vitriolati gr. vj.

Aquæ rosæ \mathfrak{z} iv. Misce fiat injectio.

(No. 91.) \mathcal{R} Balsami copaibæ \mathfrak{z} ij.

Mucilag. arabici gummi \mathfrak{z} ss.

Aquæ caecis \mathfrak{z} iv. Misce fiat injectio.

(No. 92.) \mathcal{R} Eruginis præp. gr. x.

Olei amygdalæ \mathfrak{z} iv.

Solve conterendo ut fiat injectio.

(No. 93.) \mathcal{R} Cupri vitriol. gr. iv.

Aquæ distillatæ \mathfrak{z} iv. Misce fiat injectio.

(No. 94.) \mathcal{R} Hydrargyri purificati drach. j.

Mucilaginis arabici gummi \mathfrak{z} ss.

Aquæ distillatæ \mathfrak{z} ss. Fiat injectio.

(No. 95.) \mathcal{R} Aquæ distillatæ \mathfrak{z} viiij.

Hydrargyri muriati gr. j. ad ij.

Solve, ut fiat injectio.

(No. 96.) \mathcal{R} Aquæ lithargyri acetati gutt. viij.

Aquæ rosæ \mathfrak{z} iv. Misce fiat injectio.

(No. 97.) \mathcal{R} Aquæ distillatæ \mathfrak{z} iv.

Acidi muriatici gutt. viij. misce.

This is used, with very good effect, in cases of gonorrhœa, where the scalding of the urine proves a troublesome symptom.

(No. 98.) \mathcal{R} Olei amygdalæ \mathfrak{z} iv.

Aquæ lithargyri acetati gutt. viij. Misce fiat injectio.

(No. 99.) \mathcal{R} Aquæ distillatæ \mathfrak{z} iv.

Tinct. opii gutt. xl. Fiat injectio sedativa.

(No. 100.) \mathcal{R} Zinci vitriolati gr. x.

Aquæ distillatæ \mathfrak{z} iv. Misce fiat injectio.

Dr. Saunders recommends the following:

(No. 101.) \mathcal{R} Cupr. ammoniac. (Ph. Edin.) \mathfrak{z} j.

Aquæ rosæ \mathfrak{z} v.

Solve, et utatur, more solito, pro injectione.

(No. 102.) \mathcal{R} Oxymel. ærugin. \mathfrak{z} ss.

Mellis rosæ \mathfrak{z} ij.

Decoct. hordei \mathfrak{z} iiiss. Fiat injectio.

Dr. Fordyce gives us the following formulæ :

(No. 103.) R. Aq. fontis ℥viij.

Gum. arabic. ℥vj.

Calomel. ℥ss. Misce fiat injectio.

(No. 104.) R. Aq. rosæ ℥ij.

Ceruss. acetat. gr. v. ad x. Fiat injectio.

(No. 105.) R. Ol. olivæ ℥ij.

Hydrarg. (saliva vel mucilag. gum. arabic. extinct.)

℥i. ad ℥iij. Fiat injectio.

As the gonorrhœa is only a local affection, it may be inferred, that the internal use of mercury is unnecessary towards the cure. Very often, indeed, this complaint may be removed without having recourse to mercurials. Sometimes patients have been met with, whose general health has been greatly impaired by a long-continued use of mercury in such cases, while the original disease, the gonorrhœa, was rendered much worse by it. In some, it degenerated into a gleet, that was cured with extreme difficulty; in others it brought on a variety of distressing symptoms. In cases of gonorrhœa, therefore, whenever mercury is administered, it ought to be, not with a view to expedite the cure, but merely to obviate the dangers of syphilis. When the infection is apparently slight, and the inflammation and the symptoms trifling, we may proceed without the assistance of mercury, especially if the patient be of a weak, relaxed, and irritable habit, likely to be injured by mercurial medicines. On the other hand, when the discharge is violent, the inflammation considerable, or the seat of the disease high up in the urethra, it is, perhaps, the most prudent plan to give mercurials in small doses, and in such forms as seem the best adapted to the constitution of the patient.

The *pilule hydrargyri*, as prepared according to the receipts in the last edition either of the London or Edinburgh Pharmacopœias, in both of which the mercury is rendered active merely by triture, may, perhaps, be considered as one of the mildest and most efficacious forms under which mercury can be exhibited by the mouth. Its efficacy will depend on its not irritating the bowels, and so passing off by stool; care must likewise be taken to prevent its affecting the mouth. Of the chemical preparations of mercury, the mildest and least irritating is calomel. It may be given from gr. iß. to gr. iii. at bed-time, occasionally interposing a mild purgative, to prevent it from salivating; but, in general, the mercurial pill just mentioned is to be preferred.

When there is no chancre nor bubo, no appearance, in short, of syphilitic infection, it would be improper to administer *muriated quicksilver*, *hydrargyrus calcinatus*, or any other of the more acrid preparations of mercury.

After a gonorrhœa proceeding from venereal causes has been removed, another kind of running, without pain, called the *go-*

norrbæa mucosa, or *gleet*, sometimes remains. Sometimes it arises from a constriction and excoriation of the urethra, and frequently it is the effect of an enlargement and diseased state of the prostate. In each of these cases, as the gleet is the effect of irritation, the cure will depend on the removal of the local disease that occasions it. But there is another species of gleet, that seems to depend on relaxation. It is in general free from infection, and is most common in those who have had long and frequent gonorrhœas. It is likewise the effect of a debilitated habit, from severe purging, or a long-continued use of mercurials. A discharge of this kind is more frequent in women than in men; or, at least, the *fluor albus*, after a gonorrhœa, will often be mistaken for a gleet.

When there is no reason to suspect remaining contagion, astringent injections will be of the greatest service. It will be necessary, at the same time, to attend to the health of the patient, by employing the Peruvian bark, chalybeate waters, cold bathing, and such other remedies as will tend to strengthen the system: and indeed by the use of these, particularly by the Peruvian bark, such runnings are often successfully combated in those who, from apprehensions of dangerous consequences, cannot be prevailed upon to employ injections. When there is no tendency to inflammation, balsam of copaiva may be prescribed with advantage in free doses. Dr. Simmons says he once saw a complaint of this sort removed by applying a blister to the perinæum, after it had resisted a variety of other remedies. In the Medical Observations also we have an account of a gleet and incontinence of urine removed at once by a blister to the os sacrum. In general, however, the other methods above mentioned will be sufficient to remove it, though sometimes it will continue for a long time in spite of all our endeavours to check it. Other kinds of gonorrhœa, in which the semen itself is ejected, especially during sleep, may be cured by tonics and a mild cooling regimen, as has been noticed in its proper place.

SECT. II. *Of the LUES VENEREA.*

I. *History.*] Dr. Astruc, who writes a very accurate history of the lues venerea, is fully convinced that it is a new disease, which never appeared in Europe till some time between the years 1494 and 1496, having been imported from America by the companions of Christopher Columbus; though this opinion is not without its opponents. Dr. Sanches in particular has contended, with much learning and ability, that it appeared in Europe at a much earlier period: but it is at least certain, that it was altogether unknown to the medical practitioners of Greece and Rome, and that it was a very common disease in America when the Europeans first visited that country. But at whatever period it may have been

introduced into Europe, or from whatever source it may have been obtained, there can be no doubt that, as well as small-pox or measles, syphilis depends on a peculiar specific contagion; or a matter *sui generis*, which is alone capable of inducing this disease.

The venereal infection, however, cannot, like the contagious miasmata of the small-pox and some other diseases, be carried through the air, and thus spread from place to place: for, unless it be transmitted from the parents to the children, there is no other way of contracting the disease but from actual contact with the infectious matter. Thus, when a nurse happens to labour under the disease, the infant that she suckles will receive the infection; as, on the other hand, when the child is infected, the nurse is liable to receive it: and there have even been instances known of lying-in women being infected very violently, from having employed a person to draw their breasts who happened to have venereal ulcers in the mouth. It may be caught by touching venereal sores if the cuticle be abraded or torn; and in this way accoucheurs and midwives have sometimes been infected severely. Dr. Macbride says, the most inveterate pox he ever saw was caught by a midwife, who happened to have a whitlow on one of her fingers when she delivered a woman ill of the lues venerea.

But by far the most ready way of contracting this disease is by coition, the genital parts being much more bibulous than the rest of the body. When the disorder is communicated, the places where the morbid matter enters are generally those where it first makes its appearance; and as coition is the most usual way of contracting it, so the first symptoms commonly appear on or near the pudenda.

2. *Diagnosis.*] The patient's own account will, for the most part, help us to distinguish the disease: but there are sometimes cases wherein we cannot avail ourselves of this information, and where, instead of confessing, the parties shall conceal all circumstances; while, on the other hand, there are now and then people to be met with, who persuade themselves that symptoms are venereal, which in reality are owing to some other cause: and therefore it is of the utmost importance to inform ourselves thoroughly of the nature of those symptoms and appearances which may be considered as pathognomic signs of lues venerea.

In the first place, when we find that the local symptoms, such as chancres, buboes, phymosis, and the like, do not give way to the usual methods; or when these complaints, after having been cured, break out again without a fresh infection; we may justly suspect that the virus has entered the whole mass of fluids: but if, at the same time, ulcers break out in the throat, and the face is deformed by callous tubercles, covered with a brown or yellow scab, we may be assured that the case is now become a confirmed lues, which will require a mercurial course.

When eruptions of the furfuraceous and superficial kind are venereal, they are not attended with itching; and the scale being picked off, the skin appears of a reddish brown, or rather copper-colour, underneath; whereas leprous eruptions are itchy, throw off a greater quantity of scales, and rise in greater blotches, especially about the joints of the knees and elbows. Venereal tubercles or pustules are easily distinguished from carbuncles of the face, by not occupying the cheeks or the nose, nor as having a purulent apex, but are covered at top, either with a dry branny scurf like the superficial eruptions just now mentioned, or else with a hard dry scab of a tawney yellow hue; they particularly break out among the hair or near to it on the forehead or on the temples.

Venereal ulcers affecting the mouth are distinguished from those which are scorbutic in the following manner: 1. Venereal ulcers first affect the tonsils, fauces, and uvula; then the gums, but these very rarely: on the contrary, scorbutic ulcers affect the gums first of all; then the fauces, tonsils, and uvula. 2. Venereal ulcers frequently spread to the nose; scorbutic ones almost never. 3. Venereal ulcers are callous in the edges; scorbutic ones are not so. 4. Venereal ulcers are circumscribed, and, for the most part, are circular, at least they are confined to certain places; scorbutic ones are of a more irregular form, spread wider, and frequently affect the whole mouth. 5. Venereal ulcers are for the most part hollow, and generally covered at bottom with a white or yellowough; but scorbutic ones are more apt to grow up into loose ungi. 6. Venereal ulcers are red in their circumference, but scorbutic ones are always livid. 7. Venereal ulcers frequently rot the subjacent bones, scorbutic ones seldom or never. 8. And, lastly, Venereal ulcers are mostly combined with other symptoms which are known to be venereal; scorbutic ones with the distinguishing signs of the scurvy, such as difficult breathing, listlessness, swelling of the legs, rotten gums, &c.

Another sure sign of the confirmed lues is often afforded from certain deep-seated nocturnal pains, particularly of the shins, arms, and head. As for any superficial wandering pains that have no fixed seat, and which affect the membranes of the muscles and ligaments of the joints, they, for the most part, will be found to belong to the gout or rheumatism, and can never be considered as venereal unless accompanied with some other evident signs; but with regard to the pains that are deeply seated, and always fixed to the same place, and which affect the middle and more solid part of the ulna, tibia, and bones of the cranium, and rage chiefly and with greatest violence in the forepart of the night, so that the patient can get no rest till morning approaches, these may serve to convince us that the disease has spread itself throughout the whole habit, whether they be accompanied with other symptoms of the lues or not.—*Gummata* in the fleshy parts, *nodes* in the periosteum, *ganglia* upon

the tendons, *tophi* upon the ligaments, *exostoses* upon the bones, and *fici* at the verge of the anus, are all of them signs of the confirmed lues: these are hard indolent swellings; but as they sometimes arise independently of any venereal infection, and perhaps may proceed from a scrofulous taint, unless they be accompanied or have been preceded by some of the more certain and evident symptoms of the lues, we must be cautious about pronouncing them venereal. When these swellings are not owing to the syphilitic virus, they are very seldom painful, or tend to inflame and suppurate; whereas those that are venereal usually do, and if they lie upon a bone generally bring on a caries.

These carious ulcers are most commonly met with upon the ulna, tibia, and bones of the cranium; and when accompanied with nocturnal pains, we can never hesitate about declaring their genuine nature. Frequent abortions, or the exclusion of scabby, ulcerated, half-rotten, and dead fœtuses, happening without any manifest cause to disturb the fœtus before its time, or to destroy it in the womb, may be reckoned as a sure sign that at least one of the parents is infected.

These, then, are the principal and most evident signs of the confirmed lues. There are others which are more equivocal, and which, unless we can fairly trace them back to some that are more certain, cannot be held as signs of the venereal disease.—Such are, 1. Obstinate inflammations of the eyes, frequently returning with great heat, itching, and ulceration of the eye-lids. 2. A ringing and hissing noise in the ears, with ulcers or caries in the bones of meatus auditorius. 3. Obstinate head-achs. 4. Obstinate cutaneous eruptions, of the itchy or leprous appearance, not yielding to the milder methods of treatment. 5. Swellings of the bones. And, 6. Wandering and obstinate pains. None of these symptoms, however, can be known to be venereal, except they happen to coincide with some one or other of the more certain signs.

It may, perhaps, be considered as a singularity in this disease, that the diagnosis is often more difficult in the advanced than in the early periods of the affection. That is, with those who have been certainly subjected to syphilis, it is often very difficult to say whether certain symptoms remaining after the ordinary modes of cure have been employed, be syphilitic or not. Very frequently, as appears from the sequel, nocturnal pains, ulcerations, and the like, remaining after a long course of mercury has been employed, are in no degree of a venereal nature, but are in reality to be considered as consequences rather of the remedy than of the disease; and are accordingly best removed by nourishing diet, gentle exercise, and tonics. But as long as any symptoms of any kind remain, it is often impossible to convince some patients that they are cured; and it is often impossible for a surgeon with certainty to affirm that the disease is altogether overcome.

Upon the whole, we are first to distinguish and consider the several symptoms apart; and then, by comparing them with each other, a clear judgment may be formed upon the general review.

3. *Prognosis.*] Being thoroughly convinced that the case is venereal, we are to consider, *First*, whether it be of a longer or shorter date; for the more recent it is, it will, *cæteris paribus*, be less difficult to remove. *Secondly*, whether the age, sex, and constitution of the patient are favourable, or otherwise, to the exhibition of mercury; for unless the patient have strength of body sufficient to endure the disturbance it excites in the system, the disease will go on, rather aggravated than resisted by the treatment, to a fatal termination. Hence it is, that people of a scorbutic or scrofulous habit contracting venereal disorders, have the symptoms always remarkably violent, and difficult to cure. And, for the same reasons, the confirmed lues is much more to be dreaded in a person already inclined to an asthma, phthisis, dropsy, gout, or any other chronic disease, than in one of a sound and healthy constitution. For as the original disease is increased by the accession of the venereal poison, so the lues is aggravated in consequence of the danger of employing mercury in a proper quantity, or else from the want of that vigour in the system, without which, we know by experience, that remedy is of no avail. The more numerous the symptoms, and the more they affect the bones, the more difficult the cure. Of all combinations, however, the union of *syphilis* with *scrofula* is, perhaps, the most difficult to overcome: but if the acrimony should seize on the nobler internal parts, such as the brain, the lungs, or the liver, then the disease becomes incurable, and the patient will either go off suddenly in an apoplectic fit, or sink under a consumption.

4. *Cure.*] Viewing this disease as depending on a peculiar contagious matter introduced into the system, and multiplied there, it is possible to conceive that a cure may be obtained on one of three principles; either by the evacuation of the matter from the system, by the destruction of its activity, or by counteracting its influence in the system. It is not impossible that articles exist in nature capable of removing this complaint on each of these grounds: but we may venture at least to assert, that few such are yet discovered. Notwithstanding numbers of pretended infallible remedies for syphilis, mercury is, perhaps, the only article on which dependence is placed among European practitioners; and with regard to its mode of operation, all the three different opinions pointed out have been adopted and supported by different theorists. But although many ingenious arguments have been employed in support of each, we are, upon the whole, more inclined to think it probable that mercury operates by destroying the activity of the venereal virus, than that it has effect either by evacuating it, or by exciting a state of action, by which its influence is counteracted.

Some practitioners have affirmed, that the disease may be totally extirpated without the use of mercury: but, excepting in slight cases, it appears from the most accurate observations, that this grand specific is indispensable; whether it be introduced through the pores of the skin, in the form of ointments, plasters, washes, &c.; or given by the mouth disguised in the different shapes of pills, troches, powders, or solutions.

Formerly it was held as a rule, that a *salivation* ought to be raised, and a great discharge excited. But this is now found to be unnecessary: for as mercury probably acts by some specific power in subduing and correcting the venereal virus, all that is required is to throw in a sufficient quantity for this purpose; and if it can be *diverted* from the salivary glands so much the better, since the inconveniences attending a spitting are such as we should always wish to avoid.

In employing quicksilver in venereal cases, there is reason to believe, that a preference is due to it in its most simple state. In this way, its particles are minutely divided, and not being combined with any acid, as in the case of the more elaborate preparations, its use in diseases is unattended with those inconveniences for which the latter have been very justly complained of.

The London college have given the following formulæ:

(No. 106.) ℞ Hydrargyri purificati,
Extracti glycyrrhizæ, mellis crassitudinem habentis, sing. ʒij.
Glycyrrhizæ in tenuem pulverem triti ʒj.

The quicksilver being divided by triture with the extract, the powdered liquorice is to be added.

The late Dr. Kirkland employed the following, under the name of the *quicksilver pill*:

(No. 107.) ℞ Hydrargyri purificati ʒj.
Mucilaginis arabici gummi ʒiij.
Amyli in pulverem triti q. f.

Fiant pilulæ cxx. Dosis j. ad iij. mane et nocte.

Dr. Fordyce directs the following:

(No. 108.) ℞ Hydrargyri ʒj.
Terebinth. venet. ʒiss.
Terantur simul, quamdiu guttula Hydrargyri appareat, addendo guttas aliquot olei terebinthinæ, si opus sit.
Dein cum q. f. pulv. glycyr. fiant pilulæ lxxx. capt. j. vel ij. mane et vesp.

(No. 109.) ℞ Hydrarg. purif. gr. x.
Sacchari non purif. ʒj.
Conf. cynosb. q. f.

Fiat bolus omni nocte fumendus.

The quicksilver and mucilage are to be rubbed together, and

the starch added by little and little, till the globules are extinguished, and the whole forms one uniform mass.

The process, conducted in this way, is much more expeditious than the foregoing, and there is less chance of the revivification of the quicksilver. Four grains of mercury are contained in each pill.

(No. 110.) \mathcal{R} Hydrargyri purif. gr. x.

Conf. rosæ rub. \mathfrak{z} j.

Tere simul donec globuli visum effugerint, et fiat bolus hora somni sumendus.

Quicksilver, when combined with the action of mineral acids, has its activity prodigiously increased; hence the great variety of chemical preparations of this kind which have been contrived.

They have all of them been found capable of curing the disease; though by no means with equal facility in all instances. On the contrary, practitioners find it very often a matter of indispensable necessity to change the preparation employed for some other; a circumstance which ought to put us on our guard not to persist obstinately in the use of any one preparation, merely because we have been accustomed to succeed with it in similar cases.

We shall here insert, from the books of the different hospitals in London, formulæ which include the several preparations, and which are directed, internally, in the cure of syphilis.

(No. 111.) \mathcal{R} Hydrargyri acetati \mathfrak{z} j.

Medullæ panis \mathfrak{z} ij.

Fiant pilulæ lx. Dosis ij. ad v. omni nocte.

(No. 112.) \mathcal{R} Hydrargyri præcipitati cinerei \mathfrak{z} j.

Conservi cynosbat. q. f.

Fiant pilulæ lx. Dosis j. ad iij. mane et nocte.

(No. 113.) \mathcal{R} Hydrargyri vitriolati

Opii. sing. \mathfrak{z} j.

Syrupi simplicis q. f.

Fiant pilulæ lx. Dosis j. ad iij. omni nocte.

(No. 114.) \mathcal{R} Calomelanos \mathfrak{z} j.

Pulveris opii (Ph. Lond.) \mathfrak{z} iii.

Syrupi simplicis q. f.

Fiant pilulæ lx. Dosis ij. and iv. mane et nocte.

(No. 115.) \mathcal{R} Calomelanos gr. v.

Opii in pulv. trit. gr. j.

Conf. cynosbat. q. f.

Fiat pilulâ omni nocte sumenda.

(No. 116.) \mathcal{R} Calomelanos \mathfrak{z} j.

Antimonii tartarificati gr. xv.

Opii purificati \mathfrak{z} ss.

Syrupi simplicis q. f.

Fiant pilulæ lx. Dosis j. ad iij. omni nocte.

Dr. Fordyce says, whatever preparation we employ, we should

give it in such a manner, and in such a dose, as to produce hardness, fulness, and moderate frequency of the pulse, with as little sensible evacuation as possible; for the mercury cures sooner, and with greater certainty, when the strength is but little, than when it is greatly reduced by it. Therefore, unless the case be very urgent, we are to begin with small doses at first, and afterwards gradually to increase them; giving opium and antimony, and now and then a small dose of rhubarb, if the intestines are affected; and omitting the medicine for two or three days, if there be symptoms of salivation, till these are gone off.

If any of the above preparations should purge the patient, the doctor recommends,

(No. 117.) \mathcal{R} Opii gr. $\frac{1}{2}$ ad gr. j.

Antim. tart. gr. $\frac{1}{2}$ ad gr. fs.

Misce fiat pilula capt. mane et vesp.

Muriated quicksilver, known heretofore by the name of *corrosive sublimate*, is one of the most active of all the mercurial preparations, insomuch as not to be given but in very small doses. It therefore cannot very well be employed in substance; but must be dissolved in order to render it capable of a more minute division. We may see, by looking into Wiseman, that this is an old medicine, though seldom given by regular practitioners. How it came to be introduced into so remote a part of the world as Siberia, is not easily found out; but Dr. Clerc, author of the *Histoire Naturelle de l'Homme Malade*, assures us, that this remedy has been used there time out of mind.

It appears to have been totally forgotten in other places, until some years ago, when the Baron Van Swieten brought it into vogue; so that at one period, if we credit Dr. Locher, they used no other mercurial preparation at Vienna. The number of patients cured by this remedy alone, in the hospital of Saint Mark, which was under the care of this gentleman, from 1754 to 1761 inclusive, being 4880. They prepared the solution by dissolving as much sublimate in any kind of ardent spirit (at Vienna they used only corn-brandy) as gave half a grain to an ounce of solution. The dose to a grown person was one spoonful mixed with a pint of barley-water, morning and evening.

We find in the Pharmacopœias of St. Bartholomew's and St. Thomas's hospitals, in London, the following modes of exhibiting muriated quicksilver:

(No. 118.) \mathcal{R} Hydrarg. muriat. gr. viij.

Ammonizæ muriatæ zij.

Aq. distillat. lib. j.

Solve et cola. Dosis uncia dimidia bis die.

(No. 119.) \mathcal{R} Hydrarg. muriat. gr. viij.

Sp. vinosi ten. lib. j. M.

Dosis cochleare unum ex aqua hordeata bis die.

Dr. Saunders gives the following:

(No. 120.) ℞ Hydrarg. muriat. gr. iv.
Ammoniaë muriat. gr. viij.
Sp. vinos. ten. ℥ij.

Solve, et solutionis detur cochleare minimum bis de die ex decocti hordei cyatho.

(No. 121.) ℞ Hydrarg. muriat. *mit.* gr. x.
Opii purif. gr. v.
Conf. aurant. cort. q. f.

Sint pilulæ decem, quarum detur una omni nocte.

But though extensive trials of this preparation were made, as well on the Continent as in Great Britain and Ireland, it appears by no means an infallible remedy. On the contrary, as Sir John Pringle observes, it was seldom if ever found to perform a radical cure, and the frequent use of it proved in many cases highly prejudicial. Dr. Fordyce says, the compounds of mercury and acids are uncertain remedies, and ought never to be used, unless the patient be in a situation where he runs the greatest risque of catching cold. When the hydrargyrus muriatus is given, it may be in the following form:

(No. 122.) ℞ Sp. vini dilut. (*Ang. proof-spirit dicti*) ℥ss.
Hydrarg. mur. gr. ss. ad gr. j.

Solve. capt. mane et vesp.

The use of sublimate at length was succeeded in practice, even at Vienna, by mercury exhibited in other forms; and among these by a remedy first recommended by Dr. Plenck, and since improved by Dr. Saunders; consisting of mercury united with mucilage of gum-arabic, which is said to render its exhibition perfectly mild and safe. It is thus described in the *Pharmacopœia Chirurgica*, under the name of *syrupus hydrargyri*:

(No. 123.) ℞ Hydrargyri purificati ℥j.
Pulveris arabici gummi ℥ij.
Syrupi simplicis ℥ij.
Aquæ fumarizæ ℥j.

The quicksilver being rubbed down with the gum and the syrup, the rain-water is to be afterwards added. From two to three teaspoonfuls are given night and morning.

Of a nature analogous to the foregoing is the *hydrargyrus calcinatus*, exhibited in the London hospitals in the following way:

(No. 124.) ℞ Hydrargyri calcinati
Opii purificati
Camphoræ sing. ℥j.
Syrupi simplicis q. f.
Fiant pilulæ lx. Dosis j. vel ij. omni nocte.
(No. 125.) ℞ Hydrargyri calcinati gr. x.
Pil. opii (*Ph. Lond.*) ℥j.
Mucil. gum. arabic. q. f.
Fiant pil. xx. Dosis j. ad ij. omni nocte.

Dr. Fordyce directs this preparation in the following way:
(No. 126.) ℞ Hydrarg. calcinat. gr. j. ad iij.

Extract. gentian. q. f.

Fiat pilula capt. vesp.

Dr. Hugh Smith recommends the following:
(No. 127.) ℞ Hydrarg. calcinat. gr. j. ad iij.

Sulphur. antimon. præcip. gr. iij. ad iv.

Opii purif. gr. β. ad gr. j.

Conserv. cynosbat. q. f.

Fiat Bolus omni noct. hor. decubitus fumendus.

Another mode of affecting the constitution with mercury is *Fumigation*. This was much practised by the celebrated Astruc, and has since been revived in France by Lalouette. Mr. Abernethy, who, in his *Surgical Cases*, p. 194, gives the following account of the use of Mercurial Fumigations, professes his approbation of that practice. He presents his readers with some cases which clearly shew the advantages that attend this method of treating Lues Venerea. The grounds of preference in favour of fumigation are, "*First*, from its affecting the constitution when other means have failed; and, *Secondly*, from its producing its effects in a much shorter time than any other mode requires.

"I beg leave, however, previously to observe," says Mr. Abernethy, "that the term, mercurial fumigations, is apt to excite wrong ideas of this method in the minds of surgeons. Fumigations have been, of late, generally employed to correct local diseases; and they have often, by design, been made of an acrid quality. And even when they were formerly employed with a view of affecting the constitution, it was at a time when the chemical compounds of quicksilver were not understood, and sufficient attention was not paid to those circumstances on which the success of their application depends.

"But, in the year 1776, the Chevalier Lalouette, a physician at Paris, laid before the public an account of a new mode of mercurial fumigation, free from the inconveniences of former ones, and which, in the space of thirty-five years, he had successfully employed in more than four hundred cases, that had resisted all the ordinary methods of cure. His method consisted in enclosing the patient, previously undressed, in a kind of box resembling a sedan chair, with an opening at the top to let out the head, and another at the bottom, to which was fitted a small grate or furnace, having in it a heated iron for converting the mercurial remedy into fume. The preparation he made use of was a kind of calomel, which, by repeated sublimation from iron-filings, was so far deprived of its muriatic acid, as to be in part reduced into running quicksilver; and, while it possessed considerable volatility, was perfectly irritating. Some of this powder being strewed upon the hot iron placed below, was immediately converted into smoke, which sur-

rounded the patient's body, and after some time settled on his skin in the form of a white and very fine calx of quicksilver: a complete dress, having its inner surface fumigated with the same powder, was then put on. The remedy being thus generally applied to the mouths of the cutaneous absorbents, soon got admission into the circulating fluids; and the constitution became thereby more speedily affected than by any other process known before."

For a more particular account of the chemical preparations used by M. Lalouette, and his manner of employing them, we are referred to his treatise, which was published in 1776.

With regard to the process, Mr. Abernethy further observes, that the feelings of the patient during it, are not at all unpleasant, provided the heat be properly regulated; that there is nothing uncleanly or disagreeable in the powder applied to the skin; and that all who have had an opportunity of comparing it with the common method of inunction, have been highly pleased with the superior advantages attending it. The following case is next related:

Case I. "In September, 1778, a young man had both his tonsils affected with venereal ulceration. This complaint came on after a bubo; and a great deal of mercury had been given for it without effect; for, being naturally healthy, and his bowels not easily disturbed, he had taken, on an average, from two to three grains of calcined quicksilver, or calomel joined with opium, every day for three months; and had also used mercurial ointment during the same period, beginning with two drachms, and gradually increasing it to an ounce daily: besides which, he had for a short time taken a solution of hydrargyrus muriatus. Yet all this scarcely produced any soreness of his gums, or caused any visible amendment in the ulcers of his throat; the only effect it had, being that of preventing them from becoming worse. His bowels indeed were occasionally disturbed by the medicines, but were easily quieted by opium. To rub in the quantity of mercurial ointment used towards the latter part of the course, the patient spent nearly an hour and a half every night and morning; but as he became weaker, he perspired considerably in consequence of this exercise, which tended to frustrate his endeavours by preventing, or at least greatly diminishing, the absorption of the medicine.

"No ground being gained by pursuing this plan, Mr. Blicke recommended mercurial fumigation according to Lalouette's method, which he had occasionally employed with success, and which would not only relieve the patient from the fatigue of rubbing in the ointment, but prevent any further irritation of his bowels, by superseding the internal use of mercury. The patient was accordingly exposed, for half an hour each night, to the fumes produced from half an ounce of the powder already described; by which means, in less than a fortnight, his constitution and mouth became properly affected by the mercury; the ulcers healed soon

afterwards; and in less than a month he was permitted to discontinue the remedy." Mr. Abernethy then says,

"I could relate many other cases in which fumigation accomplished, with facility, the cure of complaints which had resisted long-continued mercurial courses both by friction and internal exhibition; but I have selected this, as being rather a striking example of the difficulty which we sometimes experience, of introducing into the system, in the ordinary modes, a sufficient quantity of mercury to affect the constitution. It is reasonable to think, that this object will be more certainly obtained by the absorption thus taking place from almost the whole surface of the body, than by any other method hitherto devised. Yet it is but right to say, that my hopes of success from it have not always been fulfilled; and that, in some few cases where mercury shewed a particular tendency to act on the bowels without affecting the mouth, the mercurial fumes seemed to produce this effect even sooner than the ointment had done: and in one young man, whose mouth neither frictions nor the internal use of mercury could be made to affect, but in whom they occasioned constant tremors of the muscles, and spasms of the bowels, the fumigations were not attended with any better success. Happily, however, such cases are rare; and in general the fumigations affect the constitution speedily, and in the usual manner.

"The remarkable benefit resulting from this method of fumigation in the case mentioned above, rendered me very solicitous to introduce the practice of it into the hospital. I accordingly got a quantity of the powder prepared at the laboratory; and by using it rather more liberally than M. Lalouette directs, I found that I could in a very short time completely affect the constitution; a circumstance which I consider as a very important advantage attending this mode of employing quicksilver. Although I had satisfied myself both of the speedy and effectual operation of the medicine, exhibited in this manner, I did not, however, persist in its use; for I judged, that though the experiment should prove harmless, it could not be proper to excite a sudden and powerful constitutional affection by this mineral, where neither the obstinacy of the case, nor the rapid progress of the disease particularly called for it."—Out of six cases of which Mr. Abernethy took notes, he relates only one, to shew how quickly, by this mode, the medicine can be made to operate.

The fumigating powder of Lalouette being a very operose and expensive preparation, and having no advantage over one made by abstracting the muriatic acid from calomel, Mr. Abernethy employed the following in lieu of it: "Two drachms of aqua ammoniæ are added to six ounces of distilled water, and four ounces of calomel are thrown into this liquor, and shaken up with it; the powder is afterwards separated by a filter, and dried."

"The powder thus obtained," says he, "is of a grey colour, and contains a good deal of quicksilver in its metallic state, which of course is extremely volatile, but becomes oxydated when raised into fume, and afterwards condenses into a white and very fine dust.

"This mode of using mercury is not, however, so well adapted to hospital practice; for sometimes the iron was too much heated, and the patients were made by this means to perspire profusely, so that the powder was formed into a paste, which was irregularly incrustated on the skin; besides, the patients could not or would not wear a complete under-dress; and in that case the powder was wiped away, and the plan of treatment frustrated: for the design is to allow of a constant absorption of this subtile preparation of quicksilver from the whole surface of the body.

CASE II. "A young woman, twenty-five years of age, was admitted into the hospital, with chancres and a venereal sore throat. Both tonsils were enlarged, and on each there appeared a deep ulcer about the breadth of a shilling, having white irregular edges. On the 19th of December, half an ounce of the powder was used at one fumigation; which treatment was again repeated with the same quantity on the night of the 20th, and both on the night and morning of the 21st. As she then complained of head-ach and faintness, the fumigation was discontinued. On the 23d, her gums were much swelled and very sore: the prominent margins of the ulcers in her throat had subsided greatly, and the surface of the tonsils now hardly appeared to be ulcerated. During the three following days, the foreness of the mouth increased, and in that time the ulceration in the throat had become scarcely visible: the chancres also were healing fast. On the 27th, two drachms of the powder were used in fumigation; and the next day she was seen by all the surgeons of the hospital, who agreed that her mouth was too sore to justify the continuance of the remedy.—On the 1st of January, her mouth remained properly sore; the chancres were quite healed; and only a slight redness was perceptible in the throat, which seemed more like the effect of mercurial irritation, than of her former disease. On the 2d of January, two drachms more of the powder were used. On the 4th, her mouth was less sore; and Mr. Blicke having examined her, considered her complaint as perfectly cured. To make more sure, however, I directed that she should be fumigated with two drachms that day, and the same to be repeated on the 6th; after which she was discharged from the hospital, and promised to come back if she found any return of the disorder.

"The other cases in which this method was tried, were so similar in their circumstances and events, as to render a particular recital of them unnecessary. In every one, a considerable affection of the constitution was excited in the space of three or four days.

It is to be presumed, that these patients had no particular idiosyncrasy in respect to the operation of quicksilver. Those who are affected by that medicine slowly and with difficulty, might perhaps have withstood its action for a longer time.

“It may surely be an advantage to be able, in the generality of patients, not merely in venereal, but in other diseases, to produce so sudden and complete a *mercurial* affection of the system.”

To the objections which have been brought against the cure by fumigations, Mr. Abernethy makes this reply. He says, “I have heard it objected, that fumigation cannot be depended on for the cure of lues. But I never knew it fail, nor do I see why mercury, used thus, should, when absorbed, prove less effectual than when this mineral is combined with lard in the common ointment. If fumigations in this mode have failed, it was more probably owing to their being improperly managed, than to any insufficiency peculiar to them. Thus, if administered frequently and largely at first, they may have considerably affected the mouth without proportionally affecting the constitution in general; or, from the quickness with which they heal venereal ulceration, the cure may have been too soon supposed complete, and their use discontinued before they had entirely eradicated the disease. Under proper management, I have no doubt but mercury, employed in this manner, will be found adequate to the cure of every variety of the disease.

“Besides their general application, there is another way in which mercurial fumigations may be occasionally employed with advantage, though the benefit is less important; and perhaps this method may be regarded merely as a refinement in the practice of surgery. In local disease of the joints, such, for instance, as frequently take place in the knee, and in sarcomatous enlargements of the breast in women, Mr. Sharp and Mr. Blicke have been long accustomed to direct fumigated stockings, or under-waistcoats, to be worn; when the complaints have been relieved, and the constitutions of the patients affected, without the trouble and unpleasantness arising from the use of the common mercurial ointment.

But a French writer, supposed to be Dr. Petit, in a small book, entitled, *A Parallel of the different Methods of treating the Venereal Disease*, insists, that there is neither certainty nor safety in any other method than the repeated frictions with mercurial ointment, and his opinion is very much countenanced.

If, therefore, it is determined to have recourse to *mercurial frictions*, the patient may with advantage be prepared by going into the warm bath some days successively; having been previously bled if of a plethoric habit, and taking a dose or two of some proper cathartic.

The patient being fitted with the necessary apparatus of flannels, is then to enter on the course, which may be carried on very well

with the *ung. hydrarg.* of the London Pharmacopœia, or with the following, directed by Dr. Fordyce:

(No. 128.) ℞ Terebinth. venet. ʒij.

Hydrargyri ʒj.

Terantur simul, quamdiu guttula vel minima appareat, dein adde, Unguent. simp. ʒxiv. Misce fiat unguentum.

Turpentine is here prescribed, because we are more certain of extinguishing the mercury with it, than with any other substance (excepting balsam of sulphur, which is foetid), although it is sometimes apt to produce little pimples on the skin, which are, however, of no material consequence.

From one drachm to three of this ointment is to be rubbed thoroughly into the thighs, arms, or legs, every other night, beginning, if a salivation is not intended, with ʒiſs the first time; and, if the mouth is not at all affected, increasing it to ʒj. ʒij. the second; and gradually afterwards by gr. x. at a time, as long as the mouth will bear it. If it be intended, we begin with ʒij. every other night, and increase or diminish the dose, so that the patient shall spit from ℥ij. to ℥iv. every twenty-four hours.

The symptoms of approaching salivation are, a disagreeable taste in the mouth, and soreness of the gums or salivary glands.

It is seldom or never necessary to salivate a patient, unless he be so irritable, that the smallest dose of mercury immediately affects his mouth; or unless the disease be proceeding so fast, that it would be hazardous to wait till it was checked, by the remedy given in such a manner as to avoid salivation; or excepting when we cannot trust to his using it regularly. On the contrary, salivation rather renders the effect of the medicine uncertain.

The precautions necessary to avoid salivation, are, First, exhibiting the mercury as has just been described; Secondly, taking care not to stimulate the salivary glands, either by rubbing the skin over them, and keeping it too warm with flannel, or by any stimulus in the mouth; Thirdly, avoiding sudden exposure to cold. It is to be observed, that the patient is rendered irritable by the use of the mercury. Hence cold applied in the circumstances in which it is apt to produce diseases (as in the *Catarrh*) brings on salivation, dysentery, or rheumatism; and the stimulus of the mercury being directed to the salivary glands, or intestines, produces in them greater inflammation than that which takes place in a salivation from mercury alone, or in a dysentery from cold alone. It is by no means necessary, however, to confine him to a close warm room, except in a salivation; it is sufficient if he wear flannel or cotton next his skin, and carefully avoid a moist atmosphere, or rain, and the evening air: on the contrary, the air of a close room often, nay, sometimes that of a large town, prevents the healing

of venereal ulcers, or even the destruction of the infectious matter by the mercury, and the patient cannot be cured unless he be removed into a freer air, or into the country.

If, notwithstanding these precautions, a salivation should come on, we know of no remedy which will remove it with any degree of certainty, although sulphur, camphire, and purgatives, have been recommended for this purpose. If, therefore, the case be urgent, the best way is to let it go on, using the mercurial ointment with great circumspection; and we should confine the patient to a room where there are no streams of air, but which, at the same time, is not too warm: he should be clothed with flannel, and no food ought to be given him but what is of easy digestion and good nourishment. If the symptoms are increasing slowly, the mercury should be omitted till the salivation goes off, and afterwards recurred to.

The mercury, whether we salivate or not, should be continued four or five weeks, even if the symptoms should leave the patient before that time.

It should be continued till all the symptoms are gone off; except, First, when a *gonorrhœa* remains with little inflammation: Secondly, when the patient is much reduced by it, and there are ulcers which do not put on the appearance of healing; in this case, it is to be left off, and the patient strengthened, and the common means of curing ulcers not venereal are to be employed; if these do not succeed, he is to return to the use of the mercury: Thirdly, when ulcers covered with foetid sloughs appear, and spread exceedingly fast; in this case, bark, and the other remedies for gangrene and mortification, are to be made use of: Fourthly, when only rheumatic pains remain; these, often arising from the mercury itself, are to be cured by preparations of antimony and sassa-parilla.

If, by the imprudent use of mercury, or exposure to cold, a salivation, with great inflammation of the salivary glands and mouth, is brought on, it is to be omitted, and the common antiphlogistic remedies used, till these symptoms are carried off. If dysentery should be brought on, we are to take away from $\mathfrak{z}\text{xij}$ to $\mathfrak{z}\text{xvj}$. of blood, and afterwards to give a dose of rhubarb; lastly, to stop the purging by using opium, leaving off the mercury for a day or two.

If rheumatism is produced, it is to be treated in the manner directed in that disease under MEDICINE.

If the mercury should occasion general inflammation, to a degree which may be dangerous, from $\mathfrak{z}\text{xij}$. to $\mathfrak{z}\text{xvj}$. of blood are to be taken away.

If there be venereal ulcers of any kind, bark may be given with advantage along with the mercury, to the quantity of $\mathfrak{z}\mathfrak{ss}$ every twenty-four hours; but we are to bleed first, if the patient be of

an inflammatory habit, or plethoric. The same medicine may also be used in all cases where the patient's strength is in danger of being too much reduced by the mercury.

If there be eruptions, or pains in the bones, decoctions of woods containing resinous substances, and antimonial relaxants, are of considerable use.

(No. 129.) \mathcal{R} Rasur. lig. guaiac. \mathfrak{z} ij.

Coque in aq. font. \mathfrak{h} iv. ad ij.

Colaturæ adde, antim. tart. gr. $\frac{2}{3}$ ad gr. ijs. Divide in partes iij. capt. unam mane, alteram post pransum, tertiam H. S. quotidie.

Guaiacum, sarsaparilla, and some other remedies, have sometimes cured the disease without mercury, particularly in warm climates; but they are never to be trusted alone. The following are directed by the London College:

(No. 130.) \mathcal{R} Radicis sarsaparillæ incisæ \mathfrak{z} vj.

Aquæ distillatæ lib. viij.

These are ordered to be macerated in a heat of 195 degrees, for two hours; after which the sarsaparilla is to be taken out and bruised, and then mixed again with the decoction and macerated two hours longer. It is then to be reduced, by boiling, to two quarts, and strained.

(No. 131.) \mathcal{R} Radicis sarsaparillæ incisæ et contusæ \mathfrak{z} vi.

Corticis radicis sassafras

Ligni guaiaci rasi

Radicis glycyrrhizæ contusæ sing. \mathfrak{z} j.

Corticis radicis mezerei \mathfrak{z} ij.

Aquæ distillatæ lib. x.

These are to be macerated over a slow fire for six hours, and the liquor afterwards reduced, by boiling, to five pints. During the latter part of the process, the mezereon is to be added, and the decoction, after a short time, strained.

If the patient be not salivated by the mercury, he may use such animal food as is of easy digestion; but he is to avoid salt, spices, and wine.

If recent chancres be the symptoms of the *lues venerea*, they may often be cured by cutting off the surface, or destroying it by caustics; but the mercury should, nevertheless, be continued for a month. The same external applications are to be used to venereal ulcers, as to others of difficult cure.

A *bubo*, if it be just beginning, may sometimes be prevented from suppurating: First, by bleeding, when the habit is plethoric or inflammatory. Secondly, by immediately rubbing as much mercurial ointment on the patient's thighs as he can bear without salivation. Thirdly, by the application of poultices and fomentations (see BUBO). Fourthly, by the application of mercurial plasters. Fifthly, by *cerussa acetata*, according to some; but any salt of lead, when it lies long upon a part, is hazardous.

If a *bubo* does not suppurate, and be not totally dispersed, some of the venereal matter may remain in the gland, till some *stimulus* occasion its absorption, when the disease may be propagated over the whole system. This happens, however, very rarely, and the matter may remain in the part for years together before it makes its appearance.

Where, after a long trial of mercury, distressing symptoms still remain, particularly obstinate ulcerations, and severe pains, benefit has often been derived from the use of opium: but there is little reason to believe, as has been held by some, that of itself it affords an infallible cure of this disease; at least we are inclined to think, that all the facts hitherto brought in support of the cure of syphilis by opium alone, are, at the utmost, very doubtful, if not decidedly erroneous.

In obstinate ulcerations, remaining probably after the venereal virus has been overcome, and resisting the use of mercury, a complete cure has, in many instances, been obtained from the use of the root of the mezereon, the "*daphne mezereon*" of Linnæus. This article has been chiefly employed in the hospitals under the form of decoction:

(No. 132.) ℞ Cort. rad. mezerei ʒij.

Aq. fontanæ ℥iij.

Coque ad colat. ℥ij. quotidie sumend.

Another highly celebrated remedy in venereal complaints, is known under the title of *Lisbon diet-drink*, of which one or other of the two following is supposed to be the receipt:

(No. 133.) ℞ Sarsaparillæ incisæ

Ligni santali rubri

Ligni santali citrini sing. ʒiss.

Radicis glycyrrhizæ

Radicis mezerei sing. ʒij.

Ligni rhodii

Ligni guaiaci officinalis

Ligni assafras sing. ʒss.

Antimonii unc. j.

Aquæ distillatæ lib. v.

These ingredients are to be macerated for twenty-four hours, and afterwards boiled till the fluid is reduced to half its original quantity. From one to four pints are given daily.

(No. 134.) ℞ Sarsaparillæ incisæ

Radicis chinæ sing. ʒj.

Nucum juglandis cortice siccatarum No. xx.

Antimonii ʒij.

Lapidis pumicis pulverisati ʒj.

Aquæ distillatæ lib. x.

The powdered antimony and pumice stone are to be tied in separate pieces of rag, and boiled along with the other ingredients,

The following are said also to possess specific powers in syphilis, but they are not yet established by sufficient experience :

(No. 135.) R Lobeliæ syphilitic. p. j. coque in aq. font. cong. ifs.

Of this the patient is to begin with a quart a-day, gradually increasing it, till he cannot bear the purging it causes; he is then to discontinue it for a few days, and if any symptoms remain, he is to begin with it again, and to continue it till he finds himself well.

(No. 136.) R Extract. gratiolæ dur. 3j.

Sacch. alb.

Chel. cancr. ppt. aa ʒiiss.

M. capt. gr. x. ter in die. Dosis sensim augenda est, donec 3j. in die sumatur.

Vel, (No. 137.) R Astragali exscapi ʒiss.

Coque in Aq. fontan. ʒiiss. ad colat. ʒij.

Mane et vespere quotidie tepidam sumendam.

Upon the whole, however, the sequelæ of this disease, perhaps, more immediately require country air, gentle exercise, and nourishing diet, particularly a milk diet, than the use of medicine. For combating different anomalous appearances, various practices, accommodated to the nature of them, will, on particular occasions, be requisite; and these may be fully known by consulting the late Mr. Hunter's excellent treatise on the venereal disease.

CHAP. XXX. ON IMPOTENCE.

There are many causes of *impotence*; as, a natural defect in the organs of generation, which seldom admits of a cure; accidents or diseases, in which cases the impotence may or may not be remedied, according as these are curable or otherwise; but the common causes, and almost the only, are early and immoderate venery, or the practice of masturbation in youth. We have a few instances, indeed, of unfitness for generation in men, owing to an impediment to the ejection of the semen in coition, from a wrong direction which the orifice at the *verumontanum* has got, whereby the seed was thrown up into the bladder. M. Petit cured one patient under such a difficulty of emission, by making an incision like to that commonly made in the great operation for the stone.

On this subject, the most important and curious observations are those of the late Mr. John Hunter, who considers impotency as depending upon two causes. One he refers to the mind; the other to the organs of generation. He introduces his remarks by observing, that nothing hurts the mind of a man so much as the idea of inability to perform well the duty of the sex. "If his scrotum hangs low it makes him miserable; he conceives immediately that he is to be rendered incapable of performing those acts in which he prides himself

most. It is certain that the relaxation, or contraction of the scrotum, is in some degree a kind of sign of the constitution; but it is of the constitution at large, not of those parts in particular. Nurses are so sensible of the contraction of that part being a sign of health in the children under their care, that they take notice of it. The relaxation of it in them cannot be supposed to arise from inability to perform those acts at one time more than another. The face is one of the signs of the constitution, and has as much to do with those peculiar acts as the scrotum. However, we must allow that this part is much more lax than what we should conceive was intended by nature, even in young men who are well in health; but as this is very general, I rather suspect that it arises from the circumstances of the part being kept too warm, and always suspended, the muscles hardly ever being allowed to act, so that they have less force. How far it is the same in those countries whose dress does not immediately suspend those parts, I have not been able to ascertain. Warmth appears to be one cause, for we find that cold has always an immediate effect; but this is perhaps owing to its not being accustomed to cold, which if it were, it might possibly become as regardless of it as it was of warmth. What the difference is in this part, in a cold and warm climate, all other circumstances the same, I do not know. But whatever may be the cause, if it is really in common more lax than intended by nature, it is of no consequence as to the powers of generation. The testicles will secrete whether kept high or low."

SECT. I. *Of IMPOTENCE, as depending upon the MIND.*

On this part of the subject, he observes, that as the "parts of generation are not necessary for the existence or support of the individual, but have a reference to something else in which the mind has a principal concern; so a complete action in those parts cannot take place without a perfect harmony of body and of mind: that is, there must be both a power of body, and disposition of mind: for the mind is subject to a thousand caprices, which affect the actions of these parts.

"Copulation is an act of the body, the spring of which is in the mind; but it is not volition: and according to the state of the mind so is the act performed. To perform this act well, the body should be in health, and the mind should be perfectly confident of the powers of the body: the mind should be in a state entirely disengaged from every thing else; it should have no difficulties, no fears, no apprehensions, not even an anxiety to perform the act well; for even this anxiety is a state of mind different from what should prevail: there should not be even a fear that the mind itself may find a difficulty at the time the act should be performed. Perhaps no

function of the machine depends so much upon the state of the mind as this.

“ The will and reasoning faculty have nothing to do with this power ; they are only employed in the act, so far as voluntary parts are made use of : and if they ever interfere, which they sometimes do, it often produces another state of mind which destroys that which is proper for the performance of the act ; it produces a desire, a sort of wish, a hope, which are all only diffidence and uncertainty, and create in the mind the idea of a possibility of the want of success, which destroys the proper state of mind, or necessary confidence.

“ There is, perhaps, no act in which a man feels himself more interested, or is more anxious to perform well ; his pride being engaged in some degree, which, if within certain bounds, would produce a degree of perfection in an act depending upon the will, or an act in voluntary parts ; but when it produces a state of mind contrary to that state on which the perfection of the act depends, a failure must be the consequence.

“ The body is not only rendered incapable of performing this act by the mind being under the above influence, but also by the mind being, though perfectly confident of its power, yet conscious of an impropriety in performing it : this, in many cases, produces a state of mind which shall take away all power. The state of a man’s mind respecting his sister, takes away all power. A conscientious man has been known to lose his powers, on finding the woman he was going to be connected with unexpectedly a virgin.

“ Shedding tears arises entirely from the state of the mind, although not so much a compound action as the act in question ; for none are so weak in body that they cannot shed tears : it is not so much a compound action of the mind and strength of body joined, as the other act is ; yet if we are afraid of shedding tears, or are desirous of doing it, and that anxiety is kept up through the whole of an affecting scene, we certainly shall not shed tears, or at least not so freely as would have happened from our natural feelings.

“ From this account of the necessity of having the mind independent respecting the act, we must see that it may very often happen that the state of mind will be such as not to allow the animal to exert its natural powers ; and every failure increases the evil. We must also see, from this state of the case, that this act must be often interrupted ; and the true cause of this interruption not being known, it will be laid to the charge of the body, or want of powers. As these cases do not arise from real inability, they are to be carefully distinguished from such as do ; and perhaps the only way to distinguish them is, to examine into the state of mind respecting this act. So trifling, often, is the circumstance which shall produce this inability depending on the mind, that the very desire to please shall have that effect, as in making the woman the sole object to be gratified.

“ Cases of this kind we see every day; one of which I shall relate as an illustration of this subject, and also of the method of cure. A gentleman told me that he had lost his virility. After above an hour’s investigation of the case, I made out the following facts: that he had at unnecessary times strong erections, which shewed that he had naturally this power; that the erections were accompanied with desire, which are all the natural powers wanted; but that there was still a defect somewhere, which I supposed to be from the mind. I enquired if all women were alike to him: his answer was, No; some women he could have connection with as well as ever. This brought the defect, whatever it was, into a smaller compass: and it appeared that there was but one woman that produced this inability, and it arose from a desire to perform the act with this woman well; which desire produced in the mind a doubt or fear of the want of success, which was the cause of the inability of performing the act. As this arose entirely from the state of the mind, produced by a particular circumstance, the mind was to be applied to for the cure; and I told him that he might be cured, if he could perfectly rely on his own power of self-denial. When I explained what I meant, he told me that he could depend upon every act of his will or resolution. I then told him, that if he had a perfect confidence in himself in that respect, he was to go to bed to this woman, but first promise to himself that he would not have any connection with her for six nights, let his inclinations and powers be what they would; which he engaged to do, and also to let me know the result. About a fortnight after, he told me, that his resolution had produced such a total alteration in the state of his mind, that the power soon took place; for instead of going to bed with the fear of inability, he went with fears that he should be possessed with too much desire, too much power, so as to become uneasy to him: which really happened; for he would have been happy to have shortened the time; and when he had once broke the spell, the mind and powers went on together, and his mind never returned to its former state.”

SECT. II. *Of IMPOTENCE from want of PROPER CORRESPONDENCE between the ACTIONS of the DIFFERENT ORGANS.*

Mr. HUNTER, in a former part of his Treatise, when considering the diseases of the urethra and bladder, had remarked, that every organ in an animal body, without exception, was made up of different parts, whose functions or actions were totally different from one another, although all tending to produce one ultimate effect: In all such organs, when perfect (he observes), there is a succession of motions, one naturally arising out of the other, which, in the end, produces the ultimate effect; and an irregularity alone in these actions will constitute disease, at least will produce very disagreeable

effects, and often totally frustrate the intention of the organ. This principle Mr. Hunter, on the present occasion, applies to the "actions of the testicles and penis: for we find, that an irregularity of the actions of these parts sometimes happens in producing impotence; and something similar, probably, may be one cause of barrenness in women.

"In men, the parts subservient to generation, may be divided into two: the essential, and the accessory. The testicles are the essential; the penis, &c. the accessory. As this division arises from their uses or actions in health, which exactly correspond with one another, a want of exactness in the correspondence or susceptibility of those actions may also be divided into two: where the actions are reversed, the accessory taking place without the first, or essential, as in the erections of the penis, where neither the mind nor the testicles are stimulated to action; and the second is where the testicles perform the action of secretion too readily for the penis, which has not a corresponding erection. The first is called *priapism*; and the second is what ought to be called *seminal weakness*.

"The mind has considerable effect on the correspondence of the actions of these two parts: but it would appear, in many instances, that erections of the penis depend more on the state of the mind than the secretion of the semen does; for many have the secretion, but not the erection; but in such, the want of erection appears to be owing to the mind only.

"Priapism often arises spontaneously; and often from visible irritation of the penis, as in the venereal gonorrhœa, especially when violent. The sensation of such erections is rather uneasy than pleasant; nor is the sensation of the glans, at the time, similar to that arising from the erections of desire, but more like to the sensation of the parts immediately after coition. Such as arise spontaneously are of more serious consequence than those from inflammation, as they proceed, probably, from causes not curable in themselves, or by any known methods. The priapism arising from inflammation of the parts, as in a gonorrhœa, is attended with nearly the same symptoms; but generally the sensation is that of pain, proceeding from the inflammation of the parts. It may be observed, that what is said of priapism is only applicable to it when a disease in itself, and not when a symptom of other diseases, which is frequently the case.

"The common practice in the cure of this complaint is to order all the nervous and strengthening medicines; such as bark, valerian, musk, camphor, and also the cold bath. I have seen good effects from the cold bath; but sometimes it does not agree with the constitution, in which case I have found the warm bath of service. Opium appears to be a specific in many cases; from which circumstance I should be apt, upon the whole, to try a soothing plan.

"Seminal weakness, or a secretion and emission of the semen,

without erections, is the reverse of a priapism, and is by much the worst disease of the two. There is great variety in the degrees of this disease, there being all the gradations from the exact correspondence of the actions of all the parts to the testicles acting alone; in every case of the disease, there is too quick a secretion and evacuation of the semen. Like to the priapism, it does not arise from desires and abilities; although when mild it is attended with both, but not in a due proportion; a very slight desire often producing the full effect. The secretion of the semen shall be so quick, that simple thought, or even toying, shall make it flow.

“ Dreams have produced this evacuation repeatedly in the same night; and even when the dreams have been so slight, that there has been no consciousness of them when the sleep has been broken by the act of emission. I have known cases where the testicles have been so ready to secrete, that the least friction on the glans has produced an emission: I have known the simple action of walking or riding produce this effect, and that repeatedly, in a very short space of time.

“ A young man, about four or five and twenty years of age, not so much given to venery as most young men, had these last-mentioned complaints upon him. Three or four times in the night he would emit; and if he walked fast, or rode on horseback, the same thing would happen. He could scarcely have connection with a woman before he emitted, and in the emission there was hardly any spasm. He tried every supposed strengthening medicine, as also the cold bath, and sea-bathing, but with no effect. By taking twenty drops of laudanum on going to bed, he prevented the night emissions; and by taking the same quantity in the morning, he could walk or ride without the before-mentioned inconvenience. I directed this practice to be continued for some time, although the disease did not return, that the parts might be accustomed to this healthy state of action; and I have reason to believe the gentleman is now well. It was found necessary, as the constitution became more habituated to the opiate, to increase the dose of it.

“ The spasms, upon the evacuation of the semen in such cases, are extremely slight, and a repetition of them soon takes place; the first emission not preventing a second; the constitution being all the time but little affected*. When the testicles act alone, without the accessory parts taking up the necessary and natural consequent action, it is still a more melancholy disease; for the secretion arises from no visible or sensible cause, and does not give any visible or sensible effect, but runs off similar to involuntary stools or urine.

* “ It is to be considered, that the constitution is commonly affected by the spasms only, and in proportion to their violence, independent of the secretion and evacuation of the semen. But in some cases even the erection going off without the spasms or the emission, shall produce the same debility as if they had taken place.”

It has been observed that the semen is more fluid than natural in some of these cases.

“ There is great variety in the diseased actions of these parts; of which the following case may be considered as an example:—A gentleman has had a stricture in the urethra for many years, for which he has frequently used a bougie, but of late has neglected it. He has had no connection with women for a considerable time, being afraid of the consequences. He has often in his sleep involuntary emissions, which generally awake him at the paroxysm; but what surprises him most is, that often he has such without any semen passing forwards through the penis, which makes him think that at those times it goes backwards into the bladder. This is not always the case, for at other times the semen passes forwards. At the time the semen seems to pass into the bladder, he has the erection, the dream; and is awaked with the same mode of action, the same sensation, and the same pleasure, as when it passes through the urethra, whether dreaming or waking. My opinion is, that the same irritation takes place in the bulb of the urethra without the semen, that takes place there when the semen enters, in consequence of all the natural preparatory steps, whereby the very same actions are excited as if it came into the passage: from which one would suppose, that either the semen is not secreted, or, if it be, that a retrograde motion takes place in the actions of the acceleratores urinæ. But if the first be the case, then we may suppose, that in the natural state the actions of those muscles do not arise simply from the stimulus of the semen in the part, but from their action being a termination of a preceding one, making part of a series of actions. Thus they may depend upon the friction, or the imagination of a friction, on the penis; the testicles not doing their part, and the spasm in such cases arising from the friction, and not from the secretion. In many of those cases of irregularity, when the erection is not strong, it will go off without the emission; and at other times an emission shall happen almost without an erection; but these arise not from debility, but affections of the mind.

“ In many of the preceding cases, washing the penis, scrotum, and perinæum, with cold water, is often of service; and to render it colder than we find in some seasons of the year, common salt may be added to it, and the parts washed when the salt is almost dissolved.”

SECT. III. *Of the GENERAL EFFECTS of ONANISM, and its Disposition to occasion IMPOTENCE.*

Dr. Tissot has published a treatise on the pernicious effects of this shameful and often fatal practice, which appears to be no less baneful to the mind than to the body. He begins with observing, that

by the continual waste of the human body, aliments are required for our support. These aliments, however, require certain preparations in the body itself; and when by any means we become so altered that these preparations cannot be effected, the best aliments then prove insufficient for the support of the body. Of all the causes by which this morbid alteration is brought on, none is more common than too copious evacuations; and of all evacuations, that of the semen is the most pernicious when carried to excess. It is also to be observed, that though excess in natural venery is productive of very dangerous disorders, yet an unequal evacuation by self-pollution, which is an unnatural way, is productive of others still more to be dreaded.* The consequences enumerated by Tissot are as follow:

1. All the intellectual faculties are weakened; the memory fails; the ideas are confused, and the patient sometimes even falls into a slight degree of insanity. They are continually under a kind of inward restlessness, and feel a constant anguish. They are subject to giddiness; all the senses, especially those of seeing and hearing, grow weaker and weaker, and they are subject to frightful dreams.

2. The strength entirely fails, and the growth in young persons is considerably checked. Some are afflicted with almost continual watching, and others dose almost perpetually. Almost all of them become hypochondriac or hysteric, and are afflicted with all the evils which attend these disorders. Some have been known to spit calcareous matter; and others are afflicted with coughs, slow fevers, and consumptions.

3. The patients are affected with the most acute pains in different parts of the body, as the head, breast, stomach, and intestines; while some complain of an obtuse sensation of pain all over the body, on the slightest impression.

4. There are not only to be seen pimples on the face, which are one of the most common symptoms; but even blotches, or suppurative pustules, appear on the face, nose, breast, and thighs; and sometimes fleshy excrescences arise on the forehead.

5. The organs of generation are also affected; and the semen is evacuated on the slightest irritation, even that of going to stool. Numbers are afflicted with an habitual gonorrhœa, which entirely destroys the vigour of the constitution, and the matter of it resembles a fetid sanies. Others are affected with painful priapisms, dysurries, stranguries, and heat of urine, with painful tumors in the testicles, penis, bladder, and spermatic cord.

6. The functions of the intestines are sometimes totally destroyed; and some patients complain of costiveness, others of diarrhœa, piles, and the running of a foetid matter from the fundament.

* Tissot calculates on the debilitating effects of onanism, by stating, that the emission of *half an ounce of semen* is equal to the loss of *forty ounces* of blood.

Concerning the general facts respecting the production of *venereal impotence* by the continued practice of this beastly gratification, Mr. Hunter entertains some opinions peculiar to himself, and he treats the subject, in this view of its application, in a manner conformable to the theory he adopts with regard to the act of coition. In page 200 of his treatise on the venereal disease are the following remarks. Speaking of *Impotence*, he says, "This complaint is by many laid to the charge of onanism at an early age; but how far this is just, it will in many cases be difficult to determine; for upon a strict review of this subject, it appears to me to be by far too rare to originate from a practice so general.

"How far the attributing to this practice such a consequence, is of public utility, I am doubtful, particularly as it is followed most commonly at an age when consequences are not sufficiently attended to, even in things less gratifying to the senses; but this I can say with certainty, that many of those who are affected with the complaints in general are miserable from this idea; and it is some consolation for them to know that it is possible it may arise from other causes. I am clear in my own mind that the books on this subject have done more harm than good. I think I may affirm that this act in itself does less harm to the constitution in general than the natural. That the natural with common women, or such as we are indifferent about, does less harm to the constitution than where it is not so selfish, and where the affections for the woman are also concerned. Where it is only a constitutional act it is simple, and only one action takes place; but where the mind becomes interested, it is worked up to a degree of enthusiasm, increasing the sensibility of the body and disposition for action; and when the complete action takes place, it is with proportional violence; and in proportion to the violence is the degree of debility produced, or injury done to the constitution.

"In the cases of this kind that have come under my care, although the persons themselves have been very ready to suppose that the disease arose from the cause here alluded to; yet they did not appear to have given more into the practice than common; and in particular, the worst case I have ever seen was where but very little of this practice had ever been used, much less than in common among boys or lads. The only true objection to this selfish enjoyment is the probability of its being repeated too frequently."*

* Many persons, improperly confounding the philosophical investigator of facts with the moralist, whose offices are perfectly distinct in themselves, have objected to the moral tendency of some of Mr. Hunter's reflections on this subject. It is evident, that however the practice in question is to be reprobated by every good man, and discouraged by every medical caution which has truth for its basis, professional men addressing each other, need labour under no such restraint, nor is it for the interest of mankind, whose benefit is consulted in their labours, that it should.

With regard to the *cure of the diseases produced by onanism*, Tissot says, the first step is to leave off those practices which have occasioned the disease. This the author asserts is no easy matter; as, according to him, the soul itself becomes polluted, and can dwell on no other idea; or if she does, the irritability of the parts of generation themselves quickly recal ideas of the same kind. This irritability is, no doubt, much more to be dreaded than any pollution the soul can have received; and by removing it, there will be no occasion for exhortations to discontinue the practice. The principal means for diminishing this irritability are, in the first place, to avoid all stimulating, acrid, and spiced meats. A low diet, however, is improper, because it would further reduce the body, already too much emaciated. The food should, therefore, be nutritive, but plain, and should consist of flesh rather roasted than boiled, rich broths, &c. It is certain, however, that as these foods contribute to restore the strength of the body, the stimulus on the organs of generation will be proportionably increased, by the semen which is constantly secreted, and which will now be in larger quantity than even in healthy persons, owing to the great evacuations of it which have preceded. Some part of the semen is gradually absorbed by the lymphatics; in consequence of which, the remainder becomes thick, acrid, and very stimulating. To remedy this, exercise is to be used, and that not only for pleasure, but till it is attended with a very considerable degree of fatigue. The sleep also must be no more than is barely sufficient to repair the fatigues occasioned by the exercise, or other employment; for an excess in sleep is as bad as idleness, or stimulating foods. Excess in wine or intoxicating liquors, is also to be avoided; or rather such liquors ought never to be tasted, unless as medicine to restore the exhausted spirits: and to all this ought to be joined the Peruvian bark; which hath this admirable property, that, with little or no stimulus, it restores the tone of the system, and invigorates the body in a manner incredible to those who have not observed its effects. If these directions are followed, the patient may almost certainly expect a recovery, provided any degree of vital strength remains; and those who desire a life of celibacy on a moral account, will find them much more effectual than all the vows of chastity they can make.

On the *treatment of impotence not occasioned by onanism*, we shall be very concise. In cases where there has been a manifest want of power in the genitals, the peculiar action of cantharides on these parts has been usefully superinduced; but their exhibition is by no means accompanied with durable good effects; and their action, as provocatives to venery, has often led to injurious consequences. At any rate, when the use of this remedy is determined on, it should be employed with caution, in moderate doses, and joined with opium, bark, or camphor. In the *Pharmacopœia Chirurgica*, we have the following formula:

(No. 138.) R Cantharid. in pulv. trit. gr. xviii.

Opil purificat.

Camphoræ sing. gr. xxxvj.

Conf. cynosbat. q. f.

Fiant pilulæ xxxvj. Detur j. omni nocte.

Dr. Temple says, the patient must cautiously abstain from those remote causes of the disease which depend upon his will. The parts must be invigorated by topical bathing, and blisters to the perinæum; and the general system by bathing and tonics, and nourishing food of easy digestion. He should rise early, and not indulge in bed in a morning; and, where emissions happen during sleep, he should secure the penis by ligature, so that an erection cannot take place, without his being awaked at the beginning of it. The following medicines may eventually be serviceable in strengthening the debilitated organs:

(No. 139.) R Gum. oliban.

Pulv. cinchonæ

Pulv. rhab. aa. ʒj.

Bals. canadens. q. f.

M. fiat pill. xxxvj. quarum capiat iv. bis in die cum haustu. frequent.

(No. 140.) R Decoct. cort. simaroub. ʒij.

Acid. vitriol. dilut. gtt. xv. M. f. haustus.

Notwithstanding what has been said, it cannot but be obvious that the treatment of the diseases of those organs of the body which are designed for so curious a purpose as that of propagating the species, and which are so essentially under the *influence of the mind*, is extremely nice and difficult, and scarcely susceptible of that degree of precision which will justify our noticing the subject at any greater length.

CHAP. XXXI. ON THE DISEASES OF THE PENIS.

Amongst the diseases affecting this part of the human body, the *Gonorrhœa* might naturally have been considered; but we rather preferred treating that subject in conjunction with one not necessarily *local*, in a preceding chapter, under the character of venereal diseases. We now proceed to speak of diseases more immediately to be considered those of the penis.

SECT. I. Of PHYMOSIS and PARAPHYMOSIS.

In PHYMOSIS the prepuce is thickened, and contracted before the glans, so that it cannot be readily drawn behind it. In some people there is a constitutional phymosis from the natural straitness of

the prepuce. Sometimes it arises from the matter secreted by the odoriferous glands at the root of the glans becoming acid; sometimes from an anasarctous swelling of the scrotum and penis; but most frequently from venereal virus.

The cure must depend upon the nature of the cause producing the disease. If the symptoms be inflammatory and of no long continuance, fomenting the parts frequently with warm emollient decoctions, or bathing them in warm milk, and then applying emollient poultices, or keeping the diseased parts constantly moist with a cold astringent solution, and turning the penis upwards and supporting it against the belly, commonly give relief. If the inflammation has arisen from a venereal cause, part of the fluid ought frequently to be injected, by means of a syringe, between the prepuce and glans, so as to wash off any matter which may there be concealed; but if the inflammation still continues to increase, blood-letting is necessary, both general and local. The veins of the penis are sometimes advised to be opened with a lancet; but this is unsafe on account of the nerves. Leeches may be applied; but care must be taken, in venereal cases, lest the bites of these animals, by absorbing venereal matter, turn into chancres. Along with the remedies already advised, gentle laxatives, low diet, and abstinence, ought to be prescribed. But if, after a due perseverance in these means, it is found that they have had little effect in removing the disorder, or perhaps that the symptoms are constantly increasing, and that chancres are confined under the prepuce; in that case it is necessary to *slit open the prepuce*, which is best done by a sharp-pointed bistoury, concealed in a grooved director, fig. 78. This is to be introduced between the prepuce and glans till the director is found by the finger to have reached the upper or back part of the prepuce. The operator is now to keep the director firm with one hand, while with the other he pushes forward the knife, till its point passes through the prepuce; then drawing the instrument towards him, he cuts the prepuce through its whole length.

The operation being performed, the parts are to be washed and cleaned with warm water, and the fore dressed with a little soft lint, and a compress of linen laid over it. The whole may be retained by a small bag properly adapted, and secured by two straps to a bandage put round the body. This bag may be left open at the under end, to allow the patient to make water, without removing the dressings; but if this be found impracticable, the dressings may be removed with little inconvenience. If the glans be much inflamed and excoriated, care should be taken to insert lint spread with emollient ointment between the glans and prepuce, otherwise troublesome adhesions are apt to ensue. It is evident, that when this disease is of the venereal kind, the sore will not readily heal till the poison be eradicated from the constitution.

In some cases of phymosis the preputium is so remarkably long,

and the contraction so much confined to the point, that a circular incision is preferable to a longitudinal one; and it is easily effected, by separating such a portion as may be found necessary of the whole circumference of the prepuce. The dressings in this case are the same as when the prepuce is slit open.

PARAPHYMOSIS is the reverse of phymosis, being formed by a retraction of the prepuce, producing stricture behind the glans of the penis. Like the former disease, it arises most frequently from a venereal infection, but may be produced from whatever preternaturally enlarges the glans or constricts the prepuce.

In the incipient state, the patient may generally be relieved by the surgeon pushing the glans gently back with his thumbs, while with his fingers he brings the prepuce gradually forward. But a more effectual method than this is to enclose the glans with one of the hands, and press gently on all sides, by which the fluids forming the enlargement will be pushed into the body of the penis behind the stricture. If this method be persevered in for a considerable time, it will generally be found to answer the purpose; but should it prove ineffectual, we may try the effects of cold applications; and the best seem to be those of the astringent kind. When the penis is evidently much swelled and inflamed, the patient should be kept cool, gentle laxatives and low diet should be prescribed, and a number of leeches applied to the penis. Should the disease still continue to increase, and an œdematous swelling appear about the under part of the prepuce, an operation is necessary to prevent a mortification from taking place in the glans. An incision is to be made on each side of the penis immediately behind the glans, so large as completely to divide the stricture. The wound ought to be allowed to bleed freely; after which a pledget spread with simple ointment is to be applied, and an emollient poultice laid over the whole.

SECT. II. *Of an INCOMPLETE URETHRA.*

In children, especially males, the urethra is sometimes incomplete, ending before it reaches the usual place of termination. Sometimes it does so without any external opening, at other times it opens at a distance from the common termination. In the first case, a small trocar is to be introduced in the direction the urethra ought to take, till the urine be discharged; after which, the passage is to be kept open by the use of bougies, till the sides be rendered callous and an opening preserved. In the other case, as the opening which is already found affords a temporary passage for the urine, it will be better to delay doing any operation till the patient be further advanced in life, when it is to be performed as in the former case.

After the operation, a piece of flexible catheter may be intro-

duced, as well for the purpose of rendering the passage free and callous, as for carrying off the water till a cure is made.

SECT. III. *Of RUPTURE of the URETHRA.*

This, though an unusual, is nevertheless a possible accident, and one with which the surgeon should not be unacquainted. The following curious account of a rupture of the urethra, and of a solution of a catgut bougie in the bladder, given by Dr. Darwin, of Shrewsbury, in vol. iii. of the *Memoirs of the Medical Society of London*, will afford all the information we can supply on the subject:

“Many cases,” says the doctor, “have been related to me of a disease supposed to have been a *catarrh of the bladder*, or a suppuration of the prostate gland. In one, the patient died tabid from the purulent absorption; in another, from a sudden erysipelas and mortification of the scrotum and parts in vicinity; and in another, the patient was recovered by the use, as was supposed, of a grain of opium taken at first twice a-day, but afterwards increased. The case I am now going to relate, gave me further light into this kind of complaint; and has persuaded me that it is probable no such disease as a catarrh of the bladder ever exists.

“Mr. ———, about forty years of age, had during many years laboured under a difficulty of making water, insomuch that for two or three years together he never passed his water without previously introducing a bougie. About five years ago, he had at intervals a great quantity of a purulent sediment in his water; generally some clear urine came first, and then a tea-cupful or more of thick matter, which was sometimes so thick as to have the appearance (as he expressed it) of liquid chalk. This matter always came along with his urine, and was attended with considerable pain; but sometimes, for a month or two, the quantity of the discharge would be less, and again at times much increased, along with the difficulty of making water and pain. On drying some parcels of this matter on paper, it had a chalky appearance, which induced the patient to suspect it was the gout in the bladder. He had, during three years, occasionally, cold shivering fits, which were termed ague fits; and for which he took Peruvian bark, as he supposed, with advantage; but was always free from hectic fever: which circumstance was ascribed to the heavy discharge of the matter.

“During the long continuance of this disease many things were tried, and he consulted the most eminent surgeons in London without information or advantage. A stone was suspected, but not discovered; as an eminent surgeon in London endeavoured, in vain, at this time, to introduce even a bougie past the obstructed part of the urethra, and the prostate gland was said to be hardened and enlarged. He found some relief by using a warm fomentation every

might for an hour or two, by taking small quantities of opium, and by supping upon a pint of milk, flavoured with bitter almond and sugar, in which was dissolved half an ounce of isinglass.

“ After about five years the disease manifested itself by a permanent tumor in the perinæum, which broke externally, and the urine came along with the matter by the orifice. After it thus broke, he could never introduce a bougie beyond the wounded part, so that the cure was left to unassisted nature. The urine through the wound lessened by degrees; and, after some months, the hard sinus which was there formed, gradually disappeared, after having healed superficially, and opened again, many times: and, what is a very uncommon event, the obstruction in the urethra at the same time vanished by degrees, and he has now, for more than a year, been perfectly free from all complaint; and not only makes water freely, but is able to ride on horseback with ease, which he had not done for many years.

“ I think proper to add, that the above patient had almost from his infancy been troubled with ascarides; which were once supposed to have been subdued by a spontaneous diarrhœa, but recurred in some weeks.

“ 1. From this instructive case I think it may be fairly concluded, that the stricture or caruncle in the urethra was the original cause of the whole disease; that by the obstruction there given to the exit of the urine, the force to exclude it became exerted more violently; and thence the part of the urethra behind the stricture became distended, till it was at length ruptured. After this, the urine was pressed into the cellular membrane, and dissected its way, till a large surface became ulcerated. The same efforts which were used to exclude the urine, would press the matter out of this extensive ulcer; and some urine would also at times be pressed into it. Hence the matter always appeared mixed with the urine, and the smarting pain was urgent at the same time.

“ 2. We may conclude, with great probability, that the patient who died consumptive from the absorbed matter, as mentioned above, might have been saved for the present by proper punctures to have given exit to it; and that the erysipelas and mortification in the latter patient, might also have been prevented or cured by a puncture or two, so made as to have evacuated the intermuscular or anasarctous urine, the irritation of which was probably the immediate cause of the erysipelas and consequent mortification.

“ 3. That the cure of these cases, supposed to be catarrhs of the bladder, or suppurations of the prostate gland, may most successfully be undertaken by the assiduous use of bougies of catgut, which should be gradually enlarged till a free passage for the urine be obtained. And if any tumor from extravasated urine can be perceived and opened externally, the patient will be saved and the cure facilitated; since by these means sufficient time might be gained to di-

minish or destroy the stricture, or caruncle, by the use of bougies. The patient whose successful case I have described, when the urine passed in part through the ulcer, and he was able to force some through the narrow part of the urethra, voluntarily and carefully stopt the further violent exertions of the vesical and abdominal muscles, and was always very solicitous to let the urine pass on in a small stream, that less force might be exerted against the ruptured part of the urethra. This he thought contributed much to his cure.

“ 4. Could the irritation of the ascarides in the rectum inflame the membrane of the urethra by sympathy, and thus be a remote cause of the stricture or obstruction? I have twice remarked a polypus in the nose in children, who were both much tormented by ascarides; which, as well as other intestinal worms, occasioned by sympathy an itching in the nostrils.

“ 5. Were not the shivering fits owing to the urine insinuating itself further into the cellular membrane, and thus producing new suppurations? and the more, as they never recurred after the ulcer was open, and permitted the passage of the urine through it?”

The curious fact of the solution of a bougie in the bladder in this patient, is thus described by Dr. Darwin: “ The patient above described,” says he, “ who had been accustomed to use bougies, always before he made water, for two or three years together, fell asleep with one of them in his urethra. The bougie was simply a piece of catgut, which from its softness, when moistened, is liable to press forwards without being perceived. On waking next morning he missed the bougie, which could no-where be found by the most diligent search. He continued the use of bougies as formerly, always before he made water; and thought he frequently felt a pressure about the neck of the bladder. At the end of about four months, some filaments began to come away with his urine, and sometimes stopt the stream of it for a time. Afterwards larger pieces of the catgut were voided of an inch long or more, which were untwisted and separated as if by putrefaction; and in a few months the whole was thus evacuated. He put some catgut into a bottle of water, which became very putrid, and, upon shaking the phial, observed it to separate gradually into similar pieces.

“ This circumstance furnishes us with a powerful argument in favour of the use of catgut bougies, in preference to those made of linen, since if by any accident one of them should slip into the bladder, it will dissolve (being an animal substance) by spontaneous putrefaction; and probably by that very process prevent the formation or deposition of the calculous matter upon it, which is so liable to incrust other extraneous bodies that have accidentally got into the bladder.”

We do not entirely concur with this eminent physician on the latter subject for the reasons stated in our remarks on the bougie; and because the possibility of a bougie being drawn into the bladder may be prevented by the simplest of all means, the tying a string to it, and passing the ends round the penis, as is commonly practised.

SECT. IV. *Of AMPUTATING the PENIS.*

This operation is found necessary in certain diseases which will not yield to other remedies; as in cases of mortification and cancer. The following is the method of performing it:

A circular incision is first to be made through the sound skin a little beyond the diseased parts; the skin is then to be drawn back by an assistant, and the body of the penis divided by one stroke of the knife, immediately at the edge of the retracted skin. The principal arteries, which are two or three on each side, are next to be secured by ligatures; and if an oozing of blood still continue, the surface of the sore ought to be dusted with some styptic powder. To allow the patient to make water, a silver canula (fig. 79) is to be introduced into the urethra, and retained there by two small ligatures fixed to the side of the canula, their other extremities being fastened to a bandage put round the body. The wound is to be dressed with soft lint, kept in its place by a piece of linen previously perforated for the introduction of the canula. The dressings are to be kept on by a narrow roller passed a few times round the penis, which, by gently compressing the penis upon the instrument, will effectually prevent any further discharge of blood. The after-treatment of the sore should be similar to wounds in other parts of the body. But it will not be necessary to make any further compression of the penis upon the canula, as the discharge of blood will, previous to this time, be entirely stopped. The tube is to be allowed to remain in the urethra during the whole time of the cure.

Before any operation of this kind is attempted, the surgeon ought to examine attentively, whether the disease be in the penis itself, or only in the skin, as the prepuce alone is frequently so much enlarged and otherwise diseased as to give cause for suspicion that the glans and body of the penis are likewise affected. This precaution is the more necessary, as several instances have occurred where the glans and body of the penis have been removed, and, after the operation, have been found perfectly sound. Previous to amputation, therefore, where there is any cause for suspicion, the prepuce should be slit open, and the glans examined, so as to avoid amputating more than what is absolutely diseased.

It sometimes happens that the frænum of the penis is so short

as to give considerable uneasiness in time of an erection. When this is the case, it may be safely divided by a pair of scissars, or by a sharp-pointed bistoury, and the wound dressed with a little lint.

SECT. V. *Of the FISTULA IN PERINÆO.*

This term implies a sinuous ulcer in the perinæum, commonly communicating with the urethra, but sometimes opening into the bladder. The same term is also applied to similar sores opening into the scrotum, or into any part of the penis.

The disease may arise from wounds in the bladder, and of the urethra, from external violence; from a laceration of parts when performing the operation of lithotomy; from incision into the urethra for the extraction of calculi impacted there; from sinuses producing matter capable of corroding the membranous part of the urethra; from suppuration in the perinæum in consequence of inflammation; from the urine passing through an opening in the urethra into the perinæum, or other neighbouring parts, and rendering the edges of the fore callous: but most frequently the disease is occasioned by strictures in the urethra in consequence of repeated venereal complaints.

“Strictures,” says Mr. Home, “produce abscess in perinæo, which opens externally, and this opening gives a passage to the urine; nor can it be healed up while the obstruction remains in the urethra, and prevents the urine from passing readily in its natural course.

“Upon this principle, which is I believe very generally understood, the only treatment of such fistulæ in perinæo is the dilatation or the destruction of the stricture.”

Some of Mr. Home’s cases, given in proof of this doctrine, will be detailed in our remarks on strictures in the urethra. These at the same time shew, that where fistulæ in perinæo have been formed, the parts behind the stricture are so much thickened, and are rendered so indolent, that the common bougie is unable to dilate them; and the lower surface of the urethra, in consequence of inflammation and ulceration, where the fistulous orifices have their origin, is rendered so irregular that a bougie cannot readily pass over it. If this is not understood, the surgeon may be led to mistake the case, and suppose that there are other obstructions which prevent the bougie from passing on. The flexible gum catheter is therefore, in such instances, the only instrument by which the real state of the canal can be ascertained; since, when introduced with a stilet of metal which is bent to the curve of the urethra, the point of the instrument is always directed upwards, and

avoids any irregularity on the lower surface which might obstruct it.

In the *treatment* of this disease, when it is the consequence of a stricture, the latter must be removed by caustic, or some of the usual methods. If arising from a general affection of the system, a removal of the primary disorder is also necessary before a cure can be attempted. When the complaint is entirely of a local nature, a simple incision into the sinus is all that is necessary; and for this purpose a staff is to be introduced into the urethra, so as to pass the opening at which the urine is discharged. A probe, or a small director, is now to be passed at the external opening of the fore till it reach the staff; and cutting upon it, the sinus is to be laid open through its whole length till it terminate either in the urethra, or, if necessary, in the bladder itself. When more openings than one are present, they are to be treated in the same manner; and if the sinuses are found to be remarkably hard, the removal of a small portion of the diseased part will expedite the cure, though the consequent inflammation and suppuration will render this seldom necessary. After the operation, the wound is to be dressed with pledgets of emollient ointment, so as to allow it to fill up completely from its bottom. The whole is to be covered with a pledget of emollient ointment; and proper compresses being applied over it, the dressings are to be supported by a T bandage.

If symptoms of inflammation be violent, an emollient poultice is to be applied in the course of twenty-four hours after the operation: and as soon as free suppuration is formed, light easy dressings are to be used till the sore is completely healed.

Mr. Latta's sentiments on the treatment of fistulæ in perinæo are well illustrated in the following cases, which appear in his *System of Surgery*, vol. ii. The first of these is somewhat remarkable.

CASE I. "J. J. a man of 46 years of age, after a severe debauch with malt liquor, was seized with a strangury. On making a very strong effort, he found something, as he expressed it, give way about three inches from the point of the penis, when, to his great astonishment, the bladder was suddenly emptied without a drop of water passing in the natural way. Immediately after this, a swelling with severe pain took place in the scrotum. Twelve hours after the accident," says Mr. Latta, "I saw him: he was almost distracted with pain; the tumor very hard, and much inflamed, reaching from the ring of the external oblique muscle to near the middle of the thigh, and of a thickness proportionable to its length. He was extremely restless, his pulse very quick, and rather feeble, and on every attempt to make water, he was sensible of its passing into the tumor; which was thus continually augmented in size, with a proportionable increase of pain.

" As the patient had enjoyed good health before this time, and had never been affected with any venereal complaint, I concluded that the whole arose from a complete and strong contraction of the urethra, so that the canal itself had burst immediately above the scrotum, and discharged the contents of the bladder into it. Concluding, therefore, that the contents of the tumor could be nothing but urine, I pushed an abscess lancet directly into the tumor, near the centre, that is, about an equal distance between the abdominal ring and bottom of the scrotum. About six pounds of urine gushed out, with almost immediate relief to the patient; the wound was dressed superficially, with a little caddice moistened in oil, and gently inserted between its lips; the whole scrotum being afterwards covered with cloths dipped in solution of lead. On attempting to introduce a bougie, I found that it could not be made to pass further than two inches and an half, or at most three inches into the urethra; and it was four hours after the operation before I could pass a bougie of the smallest catgut through the obstructed part. During this interval, the urine passed wholly through the wound; but in twenty-four hours a bougie of considerable size could be introduced; and, on removing this when the patient had a desire to void his urine, some of it always flowed the natural way, though the greater part continued to pass by the scrotum.

" Thus, in a short time, the pain and inflammation of the parts began to abate, but, by the continual discharge of urine into the scrotum, a swelling took place in the testicle, which sensibly increased every time he made water. To take off this disagreeable symptom, I drew off his urine regularly by the catheter four times a-day, by which the continual addition of stimulus was prevented; he was also bled at the arm, and ten leeches afterwards applied at proper intervals; the whole being properly suspended, and kept moist with solution of sugar of lead. Thus, in six days from the time I began to use the catheter, the swelling was totally removed; but on laying it aside for twenty-four hours, though he now passed more than one half in the natural way, the swelling began to return, recourse was again had to the catheter, which it was found necessary to continue for three months, before the opening in the urethra was quite closed.

" During all this time the wound in the scrotum was carefully kept open, and every ten days an attempt was made by the patient to void his urine naturally, that it might be known whether the opening in the urethra was healed or not. As this opening diminished, the quantity of urine passing by the wound was also diminished, and the cure was at last so complete, that for ten years he has enjoyed perfect health, without the least return of any symptom that could be supposed to arise from the former complaint. In this case, finding the absolute necessity there was for preventing the urine from running through the wound, I proposed

to use the elastic catheter; but, after the patient had used an instrument of this kind for two days he was obliged to give it over, on account of the uneasiness it occasioned, particularly a desire to make water almost every half hour. On this account I had recourse to the metallic catheter, as being the only method in my power to prevent the testicle and scrotum from suffering much by the constant irritation of the urine.

CASE II. " J. M. C. a man of 42 years of age, had, like the former patient, a strangury after hard drinking. His complaint continued very severely for fourteen days, after which he observed a swelling of considerable size at the root of the penis, near the anus. By advice of a medical gentleman who attended him, he put a poultice to this tumor, in consequence of which, it was brought to a suppuration, and broke of itself. A considerable quantity of urine was voided through the opening, and this quantity continued daily to increase, appearing daily to insinuate itself more and more into the cellular substance of the perinæum, and producing a high degree of inflammation, attended with great pain, and all the symptoms of an acute fever. Thus one suppuration succeeded another, until at last he was reduced to great distress, and applied to me after six months' illness. He was then very much emaciated; his scrotum swelled to very near four times its natural size, very much inflamed; and in some places of it were sinuous openings, from which a considerable quantity of matter was discharged, part of it always coming along with the urine. There were two sinuses on each side of the rapha near the anus, through which matter was also discharged; the whole perinæum from the anus was very much swelled, and felt callous; in short, when he voided his urine, it passed through twelve different holes in the scrotum and perinæum, attended with the discharge of much matter, and most exquisite pain.

" On examining this man particularly, I found, that about four years before, he had had a gonorrhœa, which had lasted for five months; and, though then apparently cured, he had always a return of the running, with some degree of ardor urinæ, after any slight debauch; but these complaints constantly went off, upon taking a dose of cream of tartar, or Glauber's salt, and keeping himself moderately cool for a few days. When I first visited him, he had no pain or uneasiness in the perinæum, or under part of the scrotum; for that always went off after a perfect suppuration and free discharge of the matter, though the rest of the symptoms continued as before. The inflammation went on very gradually, and seemed to be occasioned by the urine insinuating itself more and more into the cellular substance, which it inflamed as it went along. He passed very little water in the natural way; and, from a supposition that his case was venereal, he had taken such a large quantity of mercury, both internally and by friction, that his

mouth had been very severely affected for near three months; the parts had also been covered with large emollient poultices of many different kinds, and he was become so weak, that he could not rise out of bed. He had often been tempted to pass a small bougie into the bladder, but without success, on account of a stricture near the neck. After several efforts, however, I was more fortunate, and got it completely introduced. At first, he was able to retain it only for about fifteen minutes, four times a-day; but, by gradually lengthening the time, while the size of the bougie was likewise increased, more and more of the urine came to be voided in the natural way; all the bad symptoms decreased, and he began to recover his strength. Persevering in the use of the bougie for three months, the whole of his urine at last passed the natural way. On account of the foetor and bad condition of the ulcers, I made use of the carrot poultice; by the continuance of which, I had the satisfaction to find, that the hardness and pain gradually went off, and all the bad symptoms at last disappeared. He has now continued well for four years, but generally introduces the bougie once in twenty-four hours; and keeps it in for an hour at a time.

CASE III. " J. D. 36 years of age, having drunk rum punch very freely one afternoon, was attacked with a difficulty of making water, attended with heat, and frequent and very painful urgings to void his urine, which after all passed only in drops. In consequence of the continuance and increase of these symptoms, he had been obliged to make use of the catheter twice a-day for fourteen days, after which his urine passed the natural way, though still with great pain and difficulty. In four weeks from the first attack, I saw him. He had then a swelling in the perinæum of the size of an hen's egg; which, being pretty soft, I opened at the most prominent place with a lancet, and thus gave vent to about two ounces of matter, seemingly of a good quality. An emollient poultice was applied over the dressings, and ordered to be renewed every two days. Thus the swelling soon disappeared, as well as the other bad symptoms; but a few drops of urine were now observed to come away by the wound every time he made water. This continued for several weeks, during which time the external wound was carefully kept open, by inserting a little cad-dice dipped in oil between its lips, to prevent the urine from insinuating itself into the cellular substance, but when the discharge in this way had stopped, the opening was allowed to heal up, and the patient went to the country, thinking that his cure was complete. But, in about twelve months after, having been fatigued, and getting cold, he was again attacked by this disorder, the strangury. It was soon got the better of, by using the cluniluvium, and keeping moderately cool; but after it went off, he perceived a little fulness in the cicatrix of the old wound. On applying poultices for three days, it broke, and discharged a quantity of

matter mixed with water. Having been in the custom of dressing his wound formerly, he treated it again in the same way, but not with the same success; for the urine having insinuated itself into the cellular substance lying backwards in the neighbourhood of the anus, a considerable swelling took place, attended with great pain and inflammation. At last it broke in two different parts near the verge of the anus, and he was obliged to apply to me.

“ At the time I saw him again, the urine was discharged at three openings, the one near the bulb of the urethra, and one on each side of the hips; the sinus of the former running downwards and backwards to the neck of the bladder, and of the two latter upwards and inwards to the same place. The adjacent parts were much hardened, the openings become truly fistulous, and the hardness and pain constantly spreading over new space; but there was no obstruction to the passage of the urine in the natural way, and the quantity of matter discharged with it never exceeded half an ounce at a time. As it now appeared necessary, however, to lay open all the sinuses to the bottom, I prepared him by a gentle laxative and injection, after which I began the operation by introducing into the neck of the bladder the grooved staff used in lithotomy, a strong probe into the sinus on the right side of the rapha, and with a round edged scalpel laid the whole open to the bottom. In like manner I proceeded with the rest, and found that all the three terminated at the membranous part of the urethra. Towards the neck of the bladder a small opening was discovered in the urethra, near the prostate gland. I enlarged this opening in the urethra to half an inch, to promote the free discharge of urine during the suppuration of the callous edges of the ulcer. The wound was slightly dressed with caddice dipped in oil, and the patient put to bed, and afterwards treated in the same manner as if he had been cut for the stone.

“ The first time this patient made water after the operation, more than one half of it passed by the wound, and this continued for six days, for the last four of which the parts were constantly covered with an emollient poultice, to promote the digestion of the hardened parts. In 14 days, little or no water was discharged by the wound; and during the whole course of the cure no medicine was found necessary, excepting twice an injection. The wounds healed up in the same manner as those which heal favourably after the operation of lithotomy. In about eight weeks they were completely whole, and for three years and a half he has remained free of every complaint.

SECT. VI. *Of OBSTRUCTIONS in the URETHRA.*

OBSTRUCTION of the urethra frequently occurs after repeated

or severe attacks of the venereal disease; but it is by no means exclusively occasioned by the latter.

Causes.] They may be owing to caruncles or fleshy excrescences in the urethra; to tumors in the lining membrane, or parts contiguous to the urethra, in consequence of inflammation; to spasmodic affections of the urethra; or to strictures properly so called.

Formerly almost every instance of obstruction in the urethra was attributed to *caruncles*, but their occurrence is much less frequent than was imagined. They are rarely found except near the point of the urethra. They are considered to be nearly of the same nature with the warts which grow upon the prepuce or root of the glans in venereal cases. Tumors obstructing the passage of the urine may be occasioned either immediately by inflammation, or in consequence of old sores within the urethra; or tumors, from whatever cause, may be seated in the corpora cavernosa contiguous to the urethra, and may press upon it in such a manner as to cause an adhesion of its sides, and thereby produce stoppage of the urine. Spasmodic strictures of the urethra sometimes arise from stone in the bladder. Sometimes in gonorrhœa there is such a degree of contraction that neither staff nor bougie can enter. This variety of obstruction is known by its coming on suddenly, and going off sometimes almost completely in the space of a few hours. Of the permanent stricture, or stricture properly so called, Mr. Hunter observes, that in most of the cases of this kind which he has seen, the disease extends no further in breadth than if the part had been surrounded with a piece of packthread. He has however seen the urethra irregularly contracted for above an inch in length, owing to its coats or internal membrane being irregularly thickened, and forming a winding canal. He further observes, that a stricture does not arise, in all cases, from an equal contraction of the urethra all round; but in some, from a contraction of one side, which throws the passage to the opposite side, and often makes it difficult to pass the bougie. In some few cases, he says, there are more strictures than one; he has seen half a dozen in one urethra, and finds that the bulbous part is much more subject to strictures than the whole of the urethra besides; that they are sometimes on this side of the bulb, but very seldom beyond it; and that they are often slow in forming, it being frequently years from the time they are perceived before they become very troublesome. Contrary to the opinion of some, Mr. Hunter doubts very much if the stricture commonly, or even ever, arises from the effects of the venereal disease, or the method of cure; for strictures are common to other passages, and sometimes happen in the urethra where no venereal complaint had ever been.

Treatment.] When obstructions are occasioned by caruncles in the urethra, bougies should be introduced, rubbed over with bland oil until a resistance is met with. When a bougie cannot be in-

roduced far enough, one with a smaller point is to be used, but not till the day following, lest the part be too much irritated. They ought not to be allowed to remain long at first, particularly when they occasion a considerable degree of pain.

When suppression of urine arises from *swellings in or about the urethra*, in consequence of inflammation, an attempt should be made to disperse these immediately, or bring them into a state of suppuration, and discharge the pus as soon as it is formed. But when the nature of the tumor is such as not to terminate in either of these ways, extirpation of the diseased parts, when this is found practicable, is the only probable means of relief. Bougies should at the same time be used to assist in the cure.

When *spasmodic affections* are present in the urethra, the remedies to be employed are, warm emollients, as rubbing the part with warm oil; anodynes, as opium given by the mouth, but more especially by the anus; blood-letting in plethoric habits, and this to be generally and locally applied; blisters put to the penis or perinæum; electricity, after plethora has been removed. Some cases may be treated with bougies; but where the disease is purely spasmodic, they are generally found to be hurtful; though in other cases, when the violence of the disease is so far removed, if they can be introduced, they are of service, by relieving any obstructions which may remain after the remedies above mentioned have been exhibited. Costiveness ought likewise to be guarded against. The permanent stricture is to be cured by bougies or by caustic.

By the bougie.] Bougies act solely by pressure, and by dilating the part; hence they should be so large as to fill the passage, and sufficiently flexible to be easily introduced. They have been prepared from various receipts which it is scarcely worth while to enumerate; the ingredients being, for the most part, alike, but differing in their proportions. We shall therefore confine our account to the following compositions, the former of which is recommended by Mr. Hunter.

(No. 141.) R Olei olivæ lib. iij.

Ceræ flavæ lib. j.

Minii lib. iiss.

These are to be boiled together over a slow fire for six hours. Bougies made with this composition will be found much too soft for immediate use, but after keeping some months will acquire sufficient firmness. If this be an objection, however, it may easily be removed, and the plaster made of a stiffer consistence, by adding two or three ounces more wax, and the like quantity of minium, and continuing the boiling till the latter is dissolved.

Bougies ought to be smooth and supple, and yet of sufficient firmness to admit of being pretty strongly urged by the hand of the surgeon, without bending or twisting in the urethra. They are formed of narrow slips of thin linen rag, which, after being

equally dipped into the melted composition, are firmly folded up and afterwards rolled on a marble slab till their surface is perfectly uniform. Their shape should be nearly equal except towards the point, which should taper very gradually for about the length of an inch.

A tolerably good composition for bougies may also be formed with litharge plaster and yellow wax, to which may be added, a small quantity of red sulphurated quicksilver. The following formula is from Swediaur:

(No. 142.) \mathcal{R} Ceræ flavæ lib. j.

Spermatis ceti drach. iij.

Cerussæ acetatæ drach. ij. ad viij.

These are to be boiled together as in the former instance, and the proportion of acetated ceruse regulated according as the bougies are designed to be of a firmer or a weaker consistence. When of a large size they should always be of the latter description, that they may the more readily conform to the shape of the passage when introduced.

Mr. Bell has given us the following still more simple formula for the composition of bougies:

(No. 143.) \mathcal{R} Emplastri lithargyri unc. iv.

Ceræ flavæ unc. ifs.

Olei olivæ drach. iij.

We are directed to melt the wax and oil in one vessel, and the litharge plaster in another, and afterwards to mix them together. Possibly by this precaution, and by melting the plaster very gradually, we may prevent the great number of air-bubbles which generally are let loose in this kind of composition, and which prove extremely inconvenient in dipping the strips of linen.

Bougies are likewise formed of catgut, a substance well calculated to penetrate a strictured part in the first instance, as it admits of being made smaller than the plaster bougie, and yet possesses a sufficient degree of elasticity and strength to allow of being pushed forward with some force. Catgut bougies are also well calculated to pass through an aperture which takes a winding sort of direction, a case in which the common bougie very frequently fails. They do less however towards *dilating* the stricture than is generally supposed, as they soon become soft and flabby, and in that state, rather yield to the pressure of the stricture, than produce the effect of dilating it.

A new invention, in which catgut is involved in elastic gum, is perhaps one of the greatest improvements lately made in the composition of simple bougies. The gum defends the catgut from the moisture of the part whilst the latter offers a sufficient resistance to the strictured part.

There are also *flexible metallic bougies*, a late invention of Mr. Smyth, an apothecary, in London, who, in the following terms,

recommends “two kinds of bougies, which, for smoothness, firmness, and pliability, will be found, by comparison, superior to any that are at present in use.—The *first* of these are *solid*, but at the same time as *flexible* as those made of common plaster, and possessed of strength and firmness enough to overcome any obstruction that *ought* to yield to pressure. They are also of so smooth a surface, that they may be introduced with ease, and so durable, that one case, containing twelve bougies of different sizes, with a little care, will last a surgeon in full practice for many years.—The *second* are *hollow*, and of sizes similar to the solid ones, finished with a stilet, or wire, of the same metal, for cases where it is judged proper to let them remain in the bladder; but in strictures requiring greater force than can be exerted with these bougies, as they are considerably softer than the silver catheter, a temporary brass, or iron wire, will give them sufficient strength for their introduction. *These* bougies, both solid and hollow, will take any degree of curvature that may be thought necessary by the operator previous to their introduction, without being injured thereby; and may be continued in the passage any length of time without danger of breaking, or giving the least pain; this he asserts from his own knowledge, having worn one of the larger ones, in some measure for the sake of the experiment, eight or nine hours at a time. They cannot be affected by the warmth of the parts to which they are applied, nor acted upon by the stricture, as frequently happens, particularly in the spasmodic contraction of the urethra, nor by the urine, which is always the case when the plaster bougie or elastic gum catheter is used. They may be had of any size, or degree of flexibility; and when tarnished, they may be repolished with a piece of shamoy leather and a little whiting. They are of a conical form, and their action is purely mechanical.”

The manner of using these bougies (which indeed applies to the introduction of *any other*) is thus described:

“Take one of the smaller sizes, and draw it between the finger and thumb to feel whether it be perfectly smooth; if that be the case, then take a little sweet-oil and rub it all over, that it may pass the easier. The patient may either stand, or sit in a chair inclining backwards, or lie in bed with his knees drawn up, which latter position is preferable to either. He may then take hold of the *penis*, near the *glans*, with one hand, and extend it gently, that the urethra may not be wrinkled, and with the other, introduce the round end of the bougie, which should be traced with a finger externally, in order to keep it in a right line with the urethra, and it will then meet with no impediment but what is occasioned by the disease. When it meets with any resistance, the patient may turn it round gently with his finger and thumb several times, and as he turns it, press it a little forwards, and continue so to do,

until he pass the obstruction, which is all that is necessary. This bougie should remain some time in the passage, and when withdrawn, another a little larger be introduced, continuing the same operation once or twice a-day, and gradually increasing the bougie to the size thought proper."

Notwithstanding what is said, however, on this subject, we are not amongst those who give a decided preference to the metallic bougie; which, perhaps, in certain cases, may prove a very useful instrument, particularly in those where the *laceration of a stricture* is intended by the surgeon.

Bougies, when properly made, can sometimes be kept in for six or eight hours together; but the length of time proper for their retention must depend much upon the feelings of the patient. At all times when they give much pain they ought to be removed, and not introduced again till the part is in a state fit for receiving them. They should be gradually increased in their size, till the passage returns to its natural dimensions. They ought to be continued for some time after, till it appear that there is no danger of a return of the complaint.

Cure by caustic.] Mr. Hunter very ingeniously employed lunar caustic in the cure of strictures in the urethra. His original method was to pass it down through a metal canula till it came in contact with the diseased part; but as that was found liable to great objections, he afterwards adopted, and since his death, his ingenious relation, Mr. Everard Home, has successfully practised the following improvement:

"Take a bougie, of a size that can be readily passed down to the stricture, and insert a small piece of lunar caustic into the end of it, letting the caustic be even with the surface, but surrounded every-where laterally by the substance of the bougie. This should be done some little time before it is required to be used; for the materials of which the bougie is composed become warm and soft by being handled, in inserting the caustic; and therefore the hold the bougie has of the caustic is rendered more secure, after it has been allowed to cool and harden. This bougie, so prepared, is to be oiled and made ready for use; but previous to passing it, a common bougie of the same size is to be introduced down to the stricture to clear the canal, and to measure exactly the distance of the stricture from the external orifice; this distance being marked upon the armed bougie, it is to be passed down to the stricture, immediately upon the other being withdrawn. In its passage, the caustic is scarcely allowed to come in contact with any part of the membrane, the *point* of the bougie, of which it forms the *central part*, always moving in the *middle line* of the canal; and indeed the quickness with which it is conveyed to the stricture prevents any injury to the membrane, were it is accidentally brought to oppose it. In this mode the caustic is passed down with little or

no irritation to the lining of the urethra; it is applied in the most advantageous manner to the stricture, and can be retained in that situation the necessary time to produce its effects."

The alleged advantages of this method are, that it produces a permanent cure, which the bougie does not, that the pain consequent on its application is inconsiderable, and that neither irritation nor inflammation are found to supervene. Some inconveniences however may, and now and then do, occur; and Mr. Home has, in a late edition of his "Practical Observations, on the Treatment of Strictures," considered them in a very candid manner, and at the same time given what we think decisive reasons why, at least in cases that do not yield to dilatation by the common bougie, the *caustic* ought to be resorted to. In his section "on the effects of the caustic on strictures," he says, "against this practice objections have been formed, and many bad consequences have been attributed to it, which it certainly does not produce: for whatever, *a priori*, might be supposed the effects of so violent an application, to a membrane so sensible and irritable as the urethra, and I will admit that it is very natural to conceive they would be very severe, the result of experience, the only thing to be relied on, evinces the contrary. The pain that is brought on is by no means violent; and neither irritation nor inflammation is found to take place.

"That cases do occur, in which strictures have produced so much mischief, and rendered so great an extent of the canal diseased, that the use of the caustic has proved unsuccessful, is certainly true; and several of these cases have fallen within my own knowledge. But when it is stated, that none, even of these, were made worse by its use; that no bad consequences attend it; and that no other mode, at present known, is equally efficacious; any occasional want of success cannot be considered as an objection to this mode of practice.

"But if the apprehension of violent effects from the caustic, however ill-founded, cannot be removed, let the alternative be considered; namely, the only operation previously in use, where a stricture cannot be dilated by the bougie.

"In those cases we are obliged to have recourse to means certainly more severe and violent, laying open with a knife the diseased urethra, and passing through the divided parts a flexible gum catheter into the bladder. This I have done myself, and have frequently seen it performed by Mr. Hunter, and it always succeeded; neither bringing on so much inflammation as was expected, nor being attended with any symptoms of irritation.

"This practice has by other surgeons been carried still further; the portion of diseased urethra has been dissected out, and entirely removed; nor has so severe an operation always brought on untoward symptoms; and patients have recovered.

"If the membrane of the urethra when diseased, is capable of

suffering so much injury, without any consequent symptoms of irritation, it cannot be doubted that it will bear with impunity to be touched, in a very partial manner, several different times with lunar caustic."

After having placed the merit of the invention, as well as the mode of applying it, where it was due; Mr. Home very properly reserves to himself the merit of these attempts to render it more generally useful.

"Having," says he, "met with a number of facts, from which a general principle appears to be established, that the irritable state of a stricture is kept up, and even increased, by the use of the bougie, but lessened and entirely destroyed by the application of lunar caustic; I am desirous to communicate my observations upon these facts, and to recommend the use of the caustic, in many cases of irritable stricture, *in preference to the bougie.*"

"As the use of the caustic upon this principle is, I believe, entirely new, and is contrary to every notion that had been formed upon the subject, it will require something more than general assertion, to gain even the attention of many of my readers, still more their belief; I shall therefore detail the circumstances as they occurred, by which I conceive the propriety of this practice to be established; and afterwards make some observations upon the principle on which it depends.

"My connection in practice with Mr. Hunter, afforded me opportunities of attending to cases of stricture, in all their different stages: many of them brought on during a long residence in India, attended with great irritability, and exceedingly difficult of cure.

"One case of this kind, which I shall presently relate, admitted the passing of a small bougie; but in the course of three years, very little was gained by a steady perseverance in the use of that instrument, either in dilating the canal, or palliating the symptoms of stricture; this made me look upon the bougie as less efficacious than I had always been taught to believe it. I was willing, however, to consider this as an uncommon case, depending more on the peculiarities of the patient's constitution than on the nature of the disease: but I found, on a particular enquiry, that several other gentlemen from India were under circumstances nearly similar; the bougie only preventing the increase of the stricture, but being unable to dilate it beyond a certain size; and when it was left off, the stricture in less than two months returned to its former state of contraction.

"What plan ought to be followed in such cases I was then unable to determine; but that the bougie could not be depended on was evident. During this suspense, the following case came under my care.

CASE I. "In August, 1794, a gentleman consulted me for

some symptoms which had been considered as indicating the presence of gonorrhœa; but as they did not yield to the common treatment in the usual time, he was induced to take my advice respecting the nature of his complaint. In the necessary enquiry to obtain a perfect history of the case, among other things it was stated, that, nineteen years before, there was a stricture which became very troublesome. and that Mr. Hunter, by the desire of the patient, had applied the caustic, by which the stricture was removed, and never after returned. He said that he was one of the first persons on whom the caustic had been used. From this account I was naturally led to believe that the stricture had gradually returned, and was now increased so much as to produce the present symptoms; a discharge being almost always a symptom of stricture, when it is much contracted: but upon examining the canal, a bougie of full size passed on to the bladder without the smallest impediment. I therefore took up the case as an inflammation in the urethra; and large doses of the balsam copaiva, given internally, effected a cure.

"The circumstance of a stricture having been removed nineteen years before, and not returning, made a strong impression on my mind; and made me desirous to ascertain whether this practice could not be employed in cases of stricture in general, and the cure produced by it, equally permanent. A short time after, I had an opportunity of trying it in the following case.

CASE II. "A captain in the East-India Company's service, in September, 1794, applied to me for assistance. His complaints were, great irritation in the urethra and bladder, constant desire to make water, and an inability to void it, except in very small quantities. These symptoms had been at first supposed to arise from gonorrhœa, afterwards fendered more severe by catching cold; but not yielding to the usual remedies for gonorrhœa, they were investigated more minutely, and a stricture was discovered in the urethra. The mode of treatment was now changed, and the bougie employed; but its use aggravated all the symptoms, and brought on so great a degree of irritability on the bladder and urethra, that there was an alarm for the patient's life, which was the reason of applying for my assistance.

"Besides the local symptoms, this patient had those of quick pulse, white tongue, hot and dry skin, loss of appetite, and total want of sleep, with frequent attacks of spasm on the bladder and urethra. A very small flexible gum catheter was passed, and the water drawn off, in quantity about a pint, which gave him great relief; this was repeated morning and evening, to keep the bladder in as easy a state as possible; but in other respects he continued much the same.

"As the present symptoms were brought on by the use of the bougie, little good was to be expected from that instrument; and

where the urethra had been so easily irritated, and was disposed to continue in that state, there was no prospect of the use of the bougie afterwards effecting a cure. These circumstances I explained to the patient; and mentioned, in proof of my opinion, the case in which so little had been effected in three years.

“ I then proposed to him a trial of the caustic, with a view to deaden the edge of the stricture, as the only probable means of effecting a cure. The degree of irritation was already great; I was, however, led to believe, that the application of the caustic was not likely to increase it; since by destroying the irritable part, it might lessen, and even remove, the spasmodic affection; but if, contrary to my expectation, the irritation continued, we still should be able to draw off the water, as the slough formed by the caustic would prevent the edge of the stricture from acting, and obstructing the instrument.

“ The application of the caustic was, upon these grounds, determined on; and it was applied in the following manner.

“ I passed a common bougie, nearly the size of the canal, down to the stricture, to ascertain its exact situation, and to make the canal of the urethra as open as possible. The distance was then marked upon a bougie armed with caustic, of the same size, which was conveyed down as quickly as the nature of the operation would admit. It was retained upon the stricture, with a slight degree of pressure; at first there was no pain from the caustic, but a soreness from pressure; in less than a minute, a change was felt in the sensation of the part, it was at first a heat, succeeded by the burning pain peculiar to caustic: as soon as this was distinctly felt, the bougie and caustic were withdrawn, having remained in the urethra about a minute altogether. The soreness, he said, was entirely local, by no means severe, was unaccompanied by irritation along the canal, and he thought the uneasiness in the bladder diminished by it. He described the pain as resembling very exactly the first symptoms of gonorrhœa. This sensation lasted half an hour after withdrawing the bougie.

“ The caustic was applied about one o’clock in the forenoon, and he passed the day more free from irritation than he had been since the beginning of the attack, which had lasted six days. In the evening the water was drawn off with more ease than the night before. He passed a tolerable night, and the next day continued free from irritation. On the third day the caustic was again applied in the forenoon; the painful sensation was less than on the former application, lasted a shorter time, and in an hour after the armed bougie was withdrawn, he made water freely for the first time since the commencement of his indisposition. He said the irritation in the bladder was removed, and he felt very well. His appetite returned, he slept well, and continued to void his urine with ease.

“ In this state nothing was done till the fifth day, leaving always a day between the applications of the caustic.

“ On this day a common-sized bougie went readily into the bladder; it was immediately withdrawn, and the cure was considered as complete; no bougie was afterwards passed, lest it might bring back an irritation upon the passage. I met this gentleman twelve months after, and he assured me he had continued perfectly well, and I have since learned that in three years there has been no return.

“ From the result of this case, I was encouraged to hope that the caustic might be applied to strictures in the urethra with more confidence than I had hitherto believed, since it evidently did not bring on or increase the general irritation; but on the contrary, seemed to allay it.

“ In this case it had taken off the disposition to spasm, which appeared to me, as I have already stated, an object of the greatest importance in the treatment of stricture in all its stages. One instance by no means afforded sufficient evidence to establish the general propriety of this practice; it justified, however, further trials, and induced me to prosecute the enquiry.

“ The case I have already alluded to, as having discouraged me more than any other in the use of the bougie, appeared to be a very proper one for the trial of the caustic, and for comparing its effects with those of the bougie, particularly as it had been of very long standing, and the bougie had been persevered in with great patience, for a sufficient length of time, without any considerable benefit. I had an opportunity of trying it, and shall therefore state the whole case here, rather than give it in detached parts.

CASE III. “ The gentleman was a lieutenant-colonel in the East-India Company's service, forty-two years of age, had been many years resident in India, and during twelve of them had more or less difficulty in making water. He came to England in 1791, and put himself under the care of Mr. Hunter. Upon passing a bougie, there were found to be two strictures in the urethra, one three inches from the external orifice, the other at the bulb. The canal was extremely irritable, and a bougie if allowed to remain in it for several minutes, produced uneasiness. The first stricture was, after a considerable time, gradually dilated; and then a small bougie was passed through the second into the bladder; after this had been continued daily, a few minutes at a time, for about a week, one a single size larger, was introduced. This larger bougie had been used for two days without any pain; but on the third the patient, immediately after it was withdrawn, walked nearly a mile; he felt a little uneasiness, which he attributed to the walk. This was followed by a spasmodic irritation in the urethra and bladder, and in the evening a complete suppression of urine took

place: in this state he remained all night, taking opium, and using other modes of relief, but without effect.

“ About four o’clock in the morning a bougie was passed down to the stricture, and allowed to remain there, pressing against it. This application was continued for fifteen minutes; the spasm began to abate, allowing a few drops of urine to pass, and in a few hours it went gradually off.

“ The bougie was now laid aside; some time after it was again tried, and things went on tolerably well for about ten days, when an uneasiness was felt in the perinæum, and a hardness discovered there, which made it necessary again to leave it off. This hardness increased, and formed a very large abscess in perinæo, which was opened. It contained about three ounces of matter, but had no communication with the urethra; and in two months healed up. When the parts were perfectly recovered, as there seemed to be no alternative, the bougie was again resorted to; and as the common sort did not lie in the passage without giving uneasiness, those of a softer kind were tried, and found to answer better; but unfortunately whenever they were regularly persevered in, they brought on, in less than two months, a local irritation, attended with constitutional indisposition, which made it necessary to omit them for a week or a fortnight. From these circumstances, at the end of three years, a bougie of no considerable size, composed of the softest materials (white wax and oil, in nearly equal proportions), could only be retained for ten minutes without irritation; but if used regularly longer than a month, irritation came upon the parts.

“ After having suffered so much under the course of bougies, the patient was willing to make trial of the caustic, and on the 20th of November, 1794, it was applied to the stricture, nearest to the orifice of the urethra, which at this time did not admit a bougie of half the common size; the effect of the caustic, after remaining a minute on the stricture, was local soreness, but no irritation; the soreness continued a quarter of an hour, and went off. The sensation was totally different from the uneasiness he had always experienced while a bougie was retained in the stricture, and although more acute, was by no means so difficult to bear; this was so decidedly his opinion, that as soon as the caustic was removed, from which he had expected very severe effects, he declared that he would at any time prefer the application of the caustic to having a bougie passed through the stricture. It was applied again on the 22d, and produced the same effects in a less degree. On the 24th, a full-sized bougie was readily passed through the first stricture, down to the second. The caustic was now applied to this stricture; after using it three times, with the interval of a day between each application, a full-sized bougie could be pushed on to the bladder, but did not pass with ease; the caustic was there-

fore used a fourth time, and then the bougie went into the bladder, and he made water freely. Thus, in fourteen days, by means of the caustic, a full-sized bougie was passed into the bladder without the smallest degree of irritation; an object which could not be effected by dilating the passage with a bougie for three years together. As the urethra had proved to be so very irritable, it was not thought prudent to use a bougie, the parts were therefore left to themselves.

"In the beginning of February, 1795, this patient caught cold, and was confined to his bed with a fever, and symptoms of oppression upon his breast, from which his life was considered in danger. For these complaints he was twice bled freely, and otherwise much reduced; during the whole of this illness there was no return of his stricture, or irritation in the bladder; but while he remained in the weak state in which it left him, on the 14th of February, he had in the night a frequent desire to make water, which passed in small quantities, and towards the morning he had some irritation in the bladder. He sent for me, a good deal alarmed at this return, after having been ten weeks free from the complaint. I saw him at eleven o'clock. On hearing his account of the symptoms, I objected to the use of the bougie, as it had always increased the irritation when employed.

"The application of the caustic to the stricture appeared to me a preferable measure, since in its present contracted state, it would be more certainly opposed to the caustic, and more effectually destroyed. This was immediately agreed to; and in five minutes after it had been used the spasm went off, and he made water with ease to the quantity of half a pint, which emptied the bladder, and entirely removed the irritation. As the stricture had evidently in some degree returned, and as I conceive that the only chance of a permanent cure depends upon the contracted part being equally dilated with the rest of the canal, or nearly so, I was not satisfied with his making water freely, and returned to the use of the caustic, to procure so desirable an effect. It was again applied, twice to the first stricture, and twice to the second; after which a full-sized bougie could be passed readily into the bladder. As this return might be attributed to leaving the urethra entirely to itself, after the use of the caustic, it was now judged proper to pass a bougie once a-day, five minutes each time, for a fortnight, and then once a month, to ascertain the state of the canal; at the end of four months I had an opportunity of passing a bougie, and at that time the stricture had not in the smallest degree returned. This gentleman went to India, and has had no return of the symptoms of stricture."

From the result of these cases, Mr. Home was satisfied that he had discovered an effectual mode of treating those strictures, *which do not admit of being relieved by the use of the bougie.* He accord-

ingly adopted this mode of treatment as a general practice: yet far from concealing the difficulties which he occasionally had to encounter, he employs a subsequent section to detail the "circumstances under which the use of the caustic proved unsuccessful." As a true estimate of the merits of this practice is of the last importance in a practical view, we shall select from this part of Mr. Home's work, what is principally stated, also some of those cases in which the success of the caustic is spoken of in its application under peculiar circumstances.

"In some constitutions," says Mr. Home, "where the patients have resided long in warm climates, every time the caustic is applied to a stricture, a regular paroxysm of fever, called by the patient an *ague*, takes place; and this has been so violent as to render it impossible to pursue this mode of practice. Of this I have met with two instances. I consider this disposition to fever, as the effect of climate, and not of any natural peculiarity of constitution; for the brother of one of these patients laboured under the same disease, but as he had not been in warm climates, it was removed by the caustic without his experiencing such attacks.

"In *gouty* constitutions, attacks of the gout have in two instances brought on spasmodic constrictions, after the stricture had been removed by caustic. This, however, cannot be called a failure of the caustic. It only shews that gout can affect strictures, and re-produce them.

"In some patients the strictures are so *obdurate*, that the use of the caustic is necessary to be continued for a longer time than the parts can bear its application, or even that of the bougie passing along the urethra; irritation therefore comes on and stops the progress of the cure, and when the same means are resorted to again, the same thing takes place. The cases of failure of this kind that I have met with, some of which may yet ultimately be cured, if the patients will take the necessary steps for that purpose, amount in all to six.

"In some patients the stricture is readily removed by the caustic, but in a few weeks contracts again. The stricture being wholly spasmodic, the caustic, by taking off the spasm, is allowed to pass through, and cannot completely destroy the stricture. Of this kind I have met with one instance, which I must consider as a failure, as I have hitherto been unable to get the better of it.

"In those cases where the caustic gradually removes the stricture, and brings the urethra to a size that allows the patient to make water perfectly well, if there is any return, it is not to be attributed to the failure of the caustic, but to the want of proper management, either from the caustic being too small, or its use left off too soon; but all such cases are, I believe, within the power of being cured by the caustic, if its use is recurred to when that is found necessary."

Mr. Home's cases, illustrating the application of the caustic to strictures, under different circumstances, are introduced with upwards of twenty *common instances*, in which this treatment succeeded perfectly. Of these the following will suffice.

CASE IV. "A gentleman who had resided ten or eleven years at Bombay, returned to England with a stricture in the urethra, which had been coming on for several years before he left India. The surgeon, under whose direction he placed himself, conceived the idea of overcoming the stricture by pressure, and instead of the bougie, passed a catheter down to the stricture, and made use of some force in pressing against it. This mode of treatment brought on irritation, gave pain, and did not after some time afford any prospect of a cure. Having heard that the use of the caustic had proved more successful, the gentleman put himself under my care.

"The stricture was situated near the bulb of the urethra: I had, therefore," says Mr. Home, "every reason to suppose there was only one, to which I applied the caustic in Nov. 1794. After it had been twice used, a full-sized bougie passed through, but did not go into the bladder. I suspected now that the prostate gland might be diseased; but found upon examination that was not the case, and this second obstruction proved to be another stricture, which it is highly probable was the original. I applied the caustic to this second stricture five times before a middling-sized bougie could be passed, and this by no means with ease; the urethra was beginning to become irritable, and the weather was intensely cold; these were circumstances peculiarly unfavourable to his constitution, which even in India had been affected by the cold season of that climate, and was much more so by the winter here. Having relieved the immediate symptoms, I wished him to remain quiet, and only to pass a bougie for a few minutes daily for some little time, till we should see what would be the effects of a change in the weather, upon the local as well as the constitutional irritability; and if the complaint was not removed under these circumstances, it would be necessary to return to the caustic.

"Nothing was done for six months; in which time the symptoms, instead of being lessened, were a good deal increased; and the caustic was again resorted to. In returning to it, the second stricture only required to be removed; the first, which had been completely destroyed, not having returned. The first time the caustic was applied it gave little pain; but the second time the parts were all disposed to contract, and I proposed that twenty drops of the tincture of opium should be taken, to diminish this degree of irritability, before it was again applied. This medicine had the desired effect; for the parts were in a much more relaxed state, and a middle-sized bougie was admitted into the bladder. This, however, was not considered as sufficient, and the application of

the caustic was continued for ten or twelve times; nor after all could a full-sized bougie be passed, the canal at this part not being enlarged to the same width as the rest of the passage.

“ Finding that nothing more at present could be done, in August, 1795, he went to the sea, and found his general health much improved by bathing; but the strictures were disposed to contract, and every four or five days he found it necessary to pass a bougie down to the last stricture, but he did not get through it, and if this was neglected the other began to lose ground. He went on in this way till January, 1796, when he came back to town and put himself again under my care; and as the weather was uncommonly mild, it was agreed to try the caustic, and see whether it now could be persevered in so as to destroy this last stricture, which had hitherto baffled all our efforts. The first applications brought on a degree of spasmodic action of the parts as before, but this was prevented by opiates; after ten or twelve applications without the smallest progress, the end of the unarmed bougie was impressed by the stricture on one side only. This being observed, the caustic was opposed, exactly to that part, it was made larger and longer, and after remaining about two minutes the stricture gave way, attended with a smart pain, and was followed by a considerable hæmorrhage, and a great deal of pain; but wholly confined to the part, not extending along the canal to the glans penis as it used to do: the stream of urine was found to be larger than before. A second application made in the same way effectually removed this obstruction; the bleeding and pain continued several days, after which a discharge came on, and they abated, and there was now a total absence of the irritation, which before had always been felt in those parts.

“ This however did not prove to be the last stricture, there was another three fourths of an inch further on. This stricture had a larger caustic applied to it than is usually employed, and after five applications little was gained, but no irritation was produced; and the seventh effectually removed it, and a common-sized bougie passed into the bladder. In destroying this last stricture, there was neither hæmorrhage nor irritation as in the others.

“ In this case the strictures were very difficult of removal, the caustic having been very often applied, and the time required was longer than in any case that I have hitherto met with. This perseverance was however in the end successful.”

From four cases of stricture attended with gleet, which ceased when the stricture was removed by the caustic we select the following:

CASE V. “ A gentleman aged twenty-five, in January, 1792, contracted a gonorrhœa, which was so violent, from the degree of inflammation, phimosis, chordee, and pain in making water, that he was not able to use an injection till the month of April; he

then used, by the advice of his surgeon, a strong injection of calomel, sugar of lead, and rose-water; this about the middle of May removed the inflammatory symptoms, and lessened the discharge, but after coition, hard drinking, or hunting, it was liable to return in considerable quantity. He bathed and took bark all the summer and autumn, but to no effect. In June, 1793, he had a very violent discharge, without any one inflammatory symptom; for which he used a vitriolic injection, composed of sixteen grains of white vitriol, and six ounces of elder flower water, mixed up with a little gum-arabic, which he injected every hour in the day, for three weeks; this stopped the discharge, except that when he committed any excess, it was liable to return. In May, 1794, the discharge became very great, without the least inflammation; the same vitriolic injection was used as before, and the discharge again diminished; he then took large doses of bark, and balsam of Tolu, copaiva, and Canada balsam; he also bathed all the summer, but the discharge never disappeared for more than a month at a time.— While he was hunting in the October following, he leaped over a five-foot wall, into a gravel-pit, which brought on a swelled testicle, inflammation of the spermatic chord, and a pain in the back, also a pain in the perinæum. The swelled testicle was cured by cold applications; but he did not venture to hunt till January, 1795. A small discharge now and then appearing, his surgeon introduced a bougie, and said he had a stricture; but after a course of bougies for three weeks, he told him he was perfectly well. The discharge returned in May, 1795. He came over to London, and put himself under the care of a surgeon, who gave him an injection, which stopped the discharge in six weeks; he was, however, subject to a return every two months, but the injection always stopped it again in a few days. In May, 1796, he had a copious discharge, without inflammation, which was treated as a gonorrhœa, till about the 12th of June, when, on passing a bougie, the surgeon found a stricture, and kept him under a constant course of bougies, wearing them for twelve or fifteen hours a-day, till July 21st. The bougies were never introduced beyond six inches and a half down the urethra. July 21st, he had evident symptoms of a swelling in the same testicle which was affected in 1794. He used constant applications of goulard, which allayed these symptoms in three days. He then used bougies again, gradually increasing the length of their application, till he again used them from twelve to fifteen hours a-day, till the 12th of August; from that time he diminished the period of their application till the 22d, when, though he had a considerable discharge, the surgeon said that he was perfectly well of the stricture, that he need not fear its return; and that bathing, with the use of the injection before employed, would remove the discharge in a very few weeks. On the 24th of August he went to the sea, and bathed every second

day till the 21st of September, without benefit. This induced him to return to London on Friday, September 23d, and put himself under my care.

"I found a stricture," says Mr. Home, "and recommended the use of the caustic, to which he readily agreed, and it was immediately applied, and repeated every other day, without giving any violent pain, or producing inflammation. On the second of October the first stricture was removed, and the caustic applied to another at $6\frac{1}{2}$ inches; this created unpleasant sensations about the bladder, so that it was necessary to quiet the parts by spirituous applications, and to give opiate medicines. Under this treatment he was well enough to bear another application of the caustic on the 5th, again on the 7th, and on the 9th, when the bougie went with ease into the bladder; on the 11th this was repeated, and the caustic passed through the stricture, after which it was left off. There was a good deal of bloody discharge for some days; on the 17th the discharge was less bloody, and less in quantity. A fortnight after, the discharge was nearly gone; a month from the last application of the caustic, the bougie passed with ease into the bladder. The discharge ceased; and I have heard from him, many months after his leaving town, and there has been no return of discharge, or any other symptom."

The next cases related are those of *Stricture with a thickening in the canal*, that forms a swelling. In these the latter subsided when the stricture was removed by the caustic.

Mr. Home says, "This tumor, when it occurs in that particular part of the canal, I conceive to arise from one of the lacunæ of the urethra being close to the stricture, the coats of which have been inflamed, and remain in a thickened state.

"My reasons for adopting this opinion are, that in four cases in which I have met with it, the situation in the canal has been the same, and in a part of the urethra where a lacuna is naturally situated. The tumor in all of them was on the lower side of the urethra. I have also met with similar swellings in consequence of the use of injections in cases of gonorrhœa, in warm climates; they were in the same part of the canal, and gradually subsided when the inflammatory symptoms went off.

"It appears that this swelling, from whatever cause it arises, subsides after the stricture is destroyed by the caustic. Such swellings, therefore, instead of being an objection to the use of the caustic, are reasons for employing it.

"These tumors may arise from a thickening of the parts simply; for I have met with a tumor of this kind in the perinæum, which I suspected to be a small stone lodged there, but it was entirely destroyed by the use of the caustic."

CASE VI. "A gentleman, aged about thirty-five, had for several years a difficulty in making water, and had been very often seized with a complete stoppage of urine. He had given bougies

several trials; and suffered all the inconveniences they produce; he had even been confined for six months at a time to give them every advantage; but was unable at last to pass one larger than a knitting needle, and that did not go on to the bladder.

“ Under these circumstances he put himself under my care, in March, 1796. There was a stricture about two inches from the orifice: this was with very great difficulty removed, requiring ten or twelve applications of the caustic; a second was met about four inches, and at this part there was a tumor, which could be felt externally, the size of a large pea. After getting through this, which required a great many applications, I was unable for a long while to enlarge the canal at this part beyond a certain size, but by increasing the diameter of the caustic, which was allowed in one application entirely to dissolve there, the tumor began to diminish in size, and in three months from his being first under my care, during which time the caustic was applied to it forty times, it was almost entirely gone. During this time he had several attacks of inflammation of the throat; these were suspected by some of his medical friends to be venereal. But I requested him not to use mercury, and they went off without any particular means being used for that purpose.

“ A bougie now passed into the bladder, and I left the parts to themselves; but a week after, on attempting to pass a bougie, I found a stricture at six inches, which from its connection with the other, had been relaxed, but afterwards contracted again. The caustic was applied to this stricture several different times, and when the bougie got beyond it, there was the feel of a hard substance, which made me suspect a small calculous concretion was lodged behind it, keeping up a degree of irritation in the canal; this, however was not the case.

“ As soon as I was able to pass a bougie freely into the bladder, I endeavoured to introduce a flexible gum catheter, but could not succeed. By persevering with the caustic two or three times more, I was able to pass a catheter, and in a future trial got the patient to do it himself, which I recommended him to practise, with the view of promoting absorption in the thickened parts by its pressure while lying in the canal.

“ The passing a flexible gum catheter, and leaving it in the bladder, at first view appears a more harsh application, and more liable to irritate than a bougie; it may therefore be objected, that I condemn the mild application of a bougie, while in particular cases I recommend a harder one: but the advantage of the catheter is, that the bladder can be emptied by it whenever there is the slightest irritation. This it takes off, and leaves the parts in an easy state, which is not the case with a bougie. It will be found in several of these cases that experience is in favour of the catheter; the same urethra which could not bear a bougie for half an hour, will allow

the catheter to remain for many hours without the smallest inconvenience.

“ The gentleman who is the subject of this case had had no return of his complaints a year after he left me, and the disposition to ulceration in the throat has been entirely removed; so that it is highly probable the former attacks were brought on by the action of the caustic on the stricture, irritating the constitution, and inducing that complaint. I have met with another instance of stricture, where a similar affection of the throat came on while the caustic was used, it returned several different times: but as I attributed it to the effects of the caustic, it gave no alarm, and always went away under the most simple modes of treatment.”

Of the effect of the caustic in those *cases of stricture which are complicated with fistulous openings* in the perinæum the following is an instance:

CASE VII. “ A gentleman, aged twenty-three, in the beginning of the year 1769 was attacked with a violent gonorrhœa, attended with heat of urine and violent chordee, which continued without relaxation for twelve weeks. At the end of about six months the stream of urine lessened, and as there was reason to suspect the formation of stricture in the urethra, a bougie was introduced, and he was desired to let it remain for some time; but from the great irritation it occasioned, he could not bear it more than a few minutes. On withdrawing it the urine flowed more freely, but not with less pain. From this time the bougie was passed once every twenty-four hours, for some months, when a suppression of urine took place, and not a drop could flow till the passage was forced by a bougie; he was now obliged to pass one every time he made water.

“ About the year 1774 he was recommended to apply to Mr. Hales, who, on passing a bougie, assured him he would effect a cure, and gave him some bougies for that purpose; these he used for a considerable time, without any benefit.

“ In the year 1778 the stricture became more contracted, and the painful symptoms increasing, attended with a tenesmus, he applied to Mr. Hunter; who, after examining the prostate gland, declared his cure to be in his own power. This assertion induced him to put himself under Mr. Hunter's care, who made use of the lunar caustic, passed through a canula, to a stricture at $6\frac{1}{2}$ inches from the external orifice; but no material benefit being obtained after applying it twenty-one times, he gave it up, and recommended the use of the bougie as before. About the year 1784, the passage was so much contracted, as not to admit the smallest bougie, and no urine flowed for more than forty-eight hours, notwithstanding the common and approved remedies of the warm bath and opium were made use of. Of tincture of opium, one hundred and twenty drops were given in twenty-four hours. When nearly all hopes

were at an end, by good fortune a small catgut bougie found the aperture, and the urine followed; after this a great discharge of brown coloured mucus passed from the bladder with the urine, attended with an aching pain and frequent solicitations to make water. The mucus was equal in quantity with the urine, and gave it a pungent volatile smell. The bougie could now pass as before; the mucus gradually diminished in quantity, and in about ten days disappeared. This symptom has attended the going off of every paroxysm of the complaint.

" About the year 1789, he applied to Mr. Pott, who recommended him to be satisfied with passing the bougie, and told him that he never knew any relief obtained by the use of the caustic.

" The complaint increasing, and the total suppression of urine becoming frequent, about 1791 he desired his case might be sent to a surgeon in London, who, after due consideration, sent him some bougies, armed by having nearly an inch of their points covered with powdered lunar caustic, which he desired might be passed through a canula (sent for that purpose) into the stricture; this was done without much benefit. In April, 1795, he was again attacked by a suppression of urine, attended with a violent strangury, symptomatic fever, loss of appetite, and continual nausea, by which he was confined to his bed for three weeks: this was followed by a swelling of the left testicle, and a considerable enlargement of the epididimis. These symptoms abated in the usual way, by a great discharge of mucus from the urethra and bladder, and also by a discharge of a considerable quantity of opaque, white, gritty matter. In June, 1795, he was attacked with a most violent pain in his back, which confined him almost constantly to his bed for three months; for this symptom he was advised the use of the warm bath, electricity, bark, &c. but without effect. In January, 1796, he was attacked with a swelling near the rectum, occasioned by the urine escaping into the cellular membrane every time he made water; this swelling increased, with a violent smarting pain, and by degrees it extended along the perinæum as far as the scrotum; at the end of a fortnight it burst, and discharged near twelve ounces of pus, of an urinous foetid smell; he was reduced by this attack to such a state of debility, as to faint on being taken out of bed. The bursting of the tumor left an opening, through which, every time he made water, some part of the urine escaped, with a violent smarting pain. As soon as his strength was sufficiently restored to bear the motion of a carriage, he came to London, which was in the beginning of May, 1796, and immediately applied to me.

" As during the complaint, bougies had been passed more than twenty thousand times, he had long been of opinion, that no permanent relief was to be expected, but from the substance being destroyed, either by the knife or the caustic. At this time the

general symptoms were, a continued gleet, pain in making water, and, for some time after, frequent and copious discharges of matter, chordee, and every sensation that attends a fresh-contracted virulent gonorrhoea.

"Upon examining the urethra," says Mr. Home, "by passing a bougie as large as the external orifice would admit, I found a stricture at five inches, and told the patient that the first thing to be done was to remove that obstruction; he told me that none of his former surgeons had found any stricture there, nor had they thought it necessary to attempt any thing at this part: that circumstance alone, I stated to him, was the cause of their failure: for he must recollect perfectly, that after the caustic or bougie in former trials had been used for any number of times, a contraction always came on at this part, and prevented him from persevering in their use; and therefore although the stricture was slight, it was necessary it should be removed. He assented to the truth of my remark, and readily submitted to my conducting the cure in the way I thought best adapted for that purpose.

"I applied the caustic to the stricture at five inches, which after four or five applications was removed. The bougie now passed down to the original stricture; to this the caustic was used for several weeks, the pain in the application was severe, and he was obliged to pass a small bougie at the time of making water as before. The fistula became very troublesome. These symptoms however gradually abated, and the pain from the caustic, after some time, hardly deserved that name; by the middle of July the use of the small bougie became unnecessary, and the call to make water was less frequent; only three times in the night.

"On the 25th the fistula was healed up, and the constant uneasiness in perinæo removed. The caustic was used in September every day for three weeks, and apparently with advantage, but the smallest bougie did not go into the bladder. September 24th, the fistula broke out, in consequence of the formation of a fresh abscess; on the 30th a silver sound passed into the bladder, and after it got beyond the part to which the caustic was applied, met no difficulty. The caustic when applied every day, gave more pain; so that after a few applications it was only used on the alternate days, and then again for a few times every day. October 17th the end of the bougie was more distinctly marked by the stricture. By Christmas the silver instrument was more readily got into the bladder; the irregularities behind the stricture preventing so weak an instrument as the bougie to pass over them. He now made water very well, and all his former symptoms were removed. He went into the country, and was to pass, once every two or three days, the silver sound into the bladder, to keep the parts in their present state. I have heard of him six months since he left town, and understand that he continues free from complaint."

The next subject offered to the reader's attention by Mr. Home, is that of *stricture with uncommon irritations*, which went off on the removal of the cause.

"In many cases of stricture," says he, "irritation takes place in the urethra when the parts are thrown into strong action, as in the coitus. This produces pain, and brings on spasm. An effect not very dissimilar, is in some instances produced by passing a bougie over the parts immediately after a stricture has been removed, the tender surface is irritated, and the effects extend to the bladder: these however go off, and are not afterwards met with.

"In the first case, the spasm is removed by the caustic, and in the other, it is an accidental violence which goes off of itself, as will appear from the following cases:

"There is in the minds of many surgeons, and almost all patients, such a dread of inflammation on the bladder, that when any symptoms of irritation attacks that viscus all means of preventing or removing inflammation are immediately had recourse to, and the ready abatement of the symptoms under their treatment, although they would have subsided of themselves, is attributed to the means made use of, which encourages the practitioners to pursue the same plan in similar cases."

The last of the cases related by Mr. Home will illustrate these circumstances very sufficiently:

CASE VIII. "A gentleman, aged thirty, about seven years since had a venereal gonorrhœa; he immediately used an injection, and in about a week, (as he had no disagreeable sensations, and no discharge) he concluded himself well, and therefore left off the injection; in about three days, however, the running returned with considerable violence: he then applied to a physician, who ordered him to drink whey in great quantities, and to take gum-arabic and nitre. The scalding and running rather increased under this treatment; he therefore, in about six weeks, applied to a surgeon, who began by giving mercurial pills and gentle purges; but not finding these to answer, gave balsam copaiva, elixir of vitriol, and an injection.

"At the end of a month, he found a difficulty in making water, upon which the surgeon passed a bougie of about 4 inches in length, which met with some obstruction; he advised him to continue the bougie in the urethra the whole of that day, and repeat it for about four or five hours the next day; and in about three or four days he directed him to wear the bougie the whole day. After wearing it for a month, the surgeon said the stricture must certainly be removed, and the bougie was left off. Bathing was afterwards directed for the cure of the discharge, which still continued as bad in colour, and as much in quantity, as ever.

"In a week the running and scalding became so disagreeable, that he determined to apply to another surgeon: this gentleman

advised taking larger doses of copaiva and elixir of vitriol than before, but this was of no service; he afterwards took hemlock pills, but with no effect. He attempted sea-bathing, but this disagreeing with him he left it off. The running and scalding, after he had been some little time at the sea, seemed rather to abate. He had during this period frequent connection with women. After he had been at the sea about six months, he felt more disagreeable sensations in the urethra than usual, and the running so much increased that he concluded himself again infected, and made use of an injection of sugar of lead and rose-water; this was of so little service that he determined to go to London. He was then put under a course of bougies: he began by using one five minutes at a time, and increased it. After wearing the bougie twice, one of the testicles gave pain in the morning, and before night it swelled considerably; the swelling and pain did not leave him for more than a month. He made water freely during that month; but after the swelling had almost subsided, and he was sufficiently well to go out, he found at times a good deal of difficulty in making water. He passed a bougie when this happened, and then the urine came forward very well; the bougie was at some times a good deal more obstructed than at others. Once he was a great deal alarmed at not being able to pass it at all. He was ordered to go to bed, and to take a decoction of marsh-mallows; he made water tolerably well before morning. It was now supposed that the complaint in his urethra proceeded from spasm. A bougie was passed repeatedly to ascertain this point, of which he at length thought there was no doubt. It was now wished to have Mr. Hunter's opinion. Mr. Hunter passed a bougie, and after it was withdrawn, said that there were three strictures in the urethra, but from the account concluded they were spasmodic. Mr. Hunter recommended, therefore, that he should always be provided with bougies, for the purpose of passing them when he had any difficulty in making water; he also advised the patient to take the extract of hemlock. The running still continued the same in quantity and colour: he took the hemlock, and entirely left off wine. Scarce a day passed without his being obliged to make use of the bougie, to enable him to make water. He perceived at times, that different parts of the urethra obstructed the bougie; at others, a moderate-sized bougie went into the bladder with scarce any obstruction. While he remained in London he had frequent nocturnal emissions, which commonly awoke him: the semen was always discharged.

“ After he had been some time in the country, he was much alarmed by having been awakened by such an irritation, without any emission. He had connection with a woman, and took means to ascertain exactly whether this would constantly be the case, and found that the same thing happened five or six times afterwards. The seventh time he had connection with a woman, in the same

manner, the semen came forward, but in very small quantity. He now made use of exercise on horseback (which he had before left off); but did not find any alteration. The symptoms at this time were exactly these: a discharge from the urethra, similar to that from a gonorrhœa, attended with some drops of blood, which generally followed the urine; a small degree of uneasiness in one of the testicles; the semen seldom coming forward in the action of the coitus, and then in small quantities; a necessity of making use of the bougie, to relieve a suppression of urine, sometimes once, sometimes oftener, in the course of the twenty-four hours. Notwithstanding these circumstances, he continued in his general health as well as he had been before he had the complaint. In about eight months he returned to the use of wine, which made no alteration whatever in the complaint for the worse; it continued without any variation till about the 7th of October, 1795. He had been in the country shooting the whole of September, and felt one morning when he was out a constant desire to make water, with a good deal of uneasiness in the bladder, which obliged him to return home and go to bed; he took an opiate draught, and had bladders of warm water applied to the perinæum.

"He felt a good deal of pain in the bladder after making water, and also in the back and kidneys; the whole of this time, the water came in a full stream. He continued in a good deal of pain for about ten days, after which it abated.

"A surgeon passed a bougie, and told him that he had one permanent stricture in the urethra, which was the cause of his complaints; he advised, as his testicle had been swelled before, that he should use the warm bath at the same time with the bougies; that he should pass the bougie, not into the bladder, but a little beyond the stricture: the pain in the bladder and kidneys gradually subsided.

"He then required the occasional use of the bougie (which he had not done while the pain continued) in order to make water. He now took exercise as usual, determining to put off the passing a bougie for the present. He did not commence wearing the bougie till May, and did not go into the warm bath. He increased the time of wearing it to about two hours in the morning, and the same at night. He continued this plan till January; the semen now almost always came forwards, but not in the usual quantity. He had connection with a woman, and in about four days had a discharge attended with a good deal of irritation in the bladder.

"Under these circumstances," says Mr. Home, "he put himself under my care. Upon examining the urethra, a stricture was found, at about five inches.

"The caustic was applied while there was a very great discharge, much irritation and tenderness. The pain of the caustic did not increase the irritation, or bring on affection of the testes, or any

other unpleasant symptom. The discharge diminished considerably, even under the use of the caustic. After applying the caustic twice to the first stricture, and five times to one at six inches, the bougie went into the bladder, and afterwards a bougie the full size of the canal passed without difficulty, but gave a great deal of pain, and brought on a paroxysm of fever, which went off; next day the discharge increased; but disappeared in a few days.

"The semen now came forward in the full quantity, and all the former irritations subsided; nor did they return in the course of the time when I had an opportunity of seeing him, which was for several months after his recovery."

The cases of *stricture attended with uncommon constitutional affection, and of stricture connected with other diseases*, are too various for selection, and would be injured by abridgment; for which reason we refer the reader to Mr. Home's work, in which he will also find much general and truly valuable information on the subject of strictures.

CHAP. XXXII. DISEASES ABOUT THE ANUS.

SECT. I. *Of Hæmorrhoids or PILES.*

The disease called hæmorrhoids, or piles, has been already considered under the head of MEDICINE; but it sometimes happens, that although the means mentioned there have been employed, the disease becomes so violent as to require the assistance of the surgeon. Where the discharge of blood is so great as to endanger the life of the patient, we ought to attempt to stop it either by compression, or by securing the bleeding vessels by a ligature; and here the tenaculum is preferable to the needle, because, when the latter is used, a portion of the rectum is apt to be included in the ligature. When piles are arrived at such a size as to obstruct the passage of the fæces, or to produce great irritation, the removal of them becomes necessary. The manner of doing this most conveniently, together with some observations on the general treatment of this complaint, have been published by Mr. Ware, in his volume of *Surgical Essays*.

"When the remedies," says Mr. Ware, "that have been mentioned, have been tried without success,—when the patient is disabled from pursuing his usual occupation,—and the pain which the hæmorrhoids occasion is both violent in degree and frequent in returning,—it becomes indispensably necessary to have recourse to other means of affording assistance; and the only ones I recollect, that have been proposed by authors since the use of the cautery and caustics has been relinquished, are—the operations of extirpating

the whole of them;—either by cutting them off with a scalpel or scissars,—or by tying a tight ligature round their basis, in order to deprive them of nourishment, and thus to cause them to die and fall off. These operations, though less dreadful than those that are relinquished, are still formidable in no small degree. The former, if the tumors are large, makes a wound of considerable extent, and risks a hæmorrhage, which has sometimes been very difficult to suppress; and the latter brings on a severe pain, which has continued many days, before the portions that are included within the ligatures have separated and come away.

“ Before recourse is had to either of these operations it may be of use to recollect, that though the number of hæmorrhoidal tumors protruded through the anus is often considerable, yet the pain which the patient suffers is not produced equally by all of these. If an accurate enquiry be made, I believe, it will be found that the patient will point to one, or at most to two, of the tumors, from whence all his pain proceeds. When these are examined, it will be discovered that they are much harder and more inflamed than the rest; and generally they are also smaller and less prominent; protruding but just low enough to be compressed by the sphincter ani.

“ If this be a just description of the state of the disorder, it follows, that the operations I have mentioned, as being in common use for its cure, when more easy means have failed of effecting it, viz. that of cutting off the whole number of hæmorrhoids with a scalpel or scissars, and that of tying a ligature round them, in order to cause them to die and fall off, are both alike unnecessary. Instead of having recourse to these severe remedies, *we have only to direct our attention to the hard inflamed tumor*, which is the cause of the pain, and which is not unfrequently situated in the centre of the rest. This is often no larger than the end of the little finger, and the removal of it almost instantly abates the pain, and, in a short time, causes the rest of the tumors to collapse and disappear. The mode in which I have performed the operation in a great variety of cases, with perfect success, is simply this. Having secured the little hard tumor, which, as above mentioned, is often situated near the centre of the rest, and much darker coloured than they are, with a common dissecting hook, or forceps, I snip it off as close to its basis as possible, with a sharp pair of curved scissars. The pain which the operation occasions is really trifling; and the hæmorrhage which follows is so slight, that I have rarely had occasion to use any application to check it. If the hæmorrhoids are constantly protruded, the operation may be performed at any time; but if they only appear after the fæces are voided, that opportunity must be chosen for this purpose.

“ In those cases where the pain produced by hæmorrhoids has not been violent, but where there is a constant distressing uneasi-

ness, with frequent returns of a profuse hæmorrhage (which hæmorrhage sometimes debilitates the patient to so great a degree that his strength is nearly exhausted), an operation similar to that I have described will not unfrequently be sufficient, in an easy manner, to effect a radical cure of the disorder. In cases of this description, as well as in those before mentioned, a careful enquiry will often discover, that *one*, or at most *two* of the hæmorrhoids are alone productive of these effects, and alone require to be removed; the excitement and protrusion of the rest being merely the effect of the irritability which these occasion.

“ The procidentia ani which accompanies hæmorrhoids usually ceases as soon as this disorder is cured. It sometimes takes place also from mere weakness in the intestinum rectum. Those who are old are particularly subject to this procidentia; but it happens occasionally to persons of all ages. A very large portion of the rectum is sometimes protruded in infants; and if it be suffered to remain long in this unnatural position, it is liable to become much inflamed, and even gangrenous. When a surgeon is called to a case of this kind, no time should be lost, but the gut be returned to its proper position, as soon as possible, by the gentle and gradual pressure of the fingers; after which a thick compress, so graduated in size as to adapt itself to the space between the nates, and steeped either in red wine, or in some astringent lotion, should be bound on the part with a T bandage, to hinder the gut from again protruding. When a bandage has been applied for the above purpose, the patient should be gentle in all his movements; since a sudden change of posture is apt to vary the degree of pressure that the bandage makes, and to allow the bowel again to protrude; in which case the pressure of the bandage on the tender gut has been found to do harm rather than service. In some instances of the procidentia ani, the patients have been served by introducing into the rectum, morning and evening, a tent about two inches long, and as thick as the little finger, made of a candle or of some stiff cerate. So long as a tent of this kind preserves its consistency, it compresses the sides of the gut and hinders it from coming down; but when it is melted by the heat of the part it loses its efficacy; and therefore the application of the compress and bandage above described is necessary, at the same time that the tent is used, in order to assist its action. The internal administration of the medicine known by the name of *Ward's paste* (No. 207, page 228, of vol. II.) has also in some instances of procidentia been found useful to strengthen the debilitated intestine.

“ If the procidentia has been of long continuance, it must be confessed, after all, that none of these means can be depended upon, as affording a certain security against the return of the disorder, not only after a costive stool, but on any quick or sudden motion of the body. In all these cases, it is the duty of the surgeon very

accurately to examine the state of the protruded part; since, in some it has been found that a small portion of the gut has been evidently more tumified than the rest, and more tender when touched with the finger; the removal of which tumified part, in the way I have recommended common hæmorrhoids to be removed in the preceding pages, has occasioned the remainder to collapse, and the patient to become quite well."

We are particularly disposed to agree with Mr. Ware in the following objections to the removal of hæmorrhoids by the ligature. He says,

"Former authors, and particularly Mr. Benjamin Bell of Edinburgh, seem to leave it, as a matter of indifference, whether hæmorrhoids be cut off or tied off. The violent pain which the operation of tying them occasions, and the continuance of this pain for two or three days together, are objections to the use of the ligature, which, in my own mind, I have never been able to overcome. At the same time the danger that is liable to arise from a profuse hæmorrhage, after cutting off so large a number of hæmorrhoids as often protrudes in this disorder, is with many an objection of no small weight against the old mode of excision; although I believe this hæmorrhage may always be hindered from becoming seriously troublesome, if a due attention be paid to keep the patient cool, and to avoid hot liquors for the first day or two after the operation has been performed." Whether the danger be greater or less, it cannot but be considerably diminished by the alteration in the mode of operating which Mr. Ware has suggested.

With regard to the treatment after the operation, he says, "a thick compress should be applied, wet either with cold brandy and water, or with a cold saturnine lotion; retaining it on the part with the usual T bandage. The patient should be directed to keep perfectly still; to lie rather cooler than usual in bed; and to take nothing, in the way of diet, that is either hot or strong. I remember only two instances," says Mr. Ware, "in a considerable number of this kind, in which further attentions were found necessary. In neither of these did any ill consequences follow, except the alarm from an hæmorrhage, which was quickly suppressed: and the history of one of them is given in the sixth case that will be found annexed to these remarks.

CASE I. "A gentleman in Birchin-lane applied to me, about three years ago, on account of an hæmorrhoidal disorder to which he had been subject many years. For the last twelve months several large tumors were protruded through the sphincter and whenever he had a stool, and afterwards they not only bled, but he was often for hours in so much pain, that he was unable to attend to any business. Many medicines had been given him, and different applications employed, but without affording him any assistance.

On an examination, I found a considerable number of hæmorrhoids protruded through the anus, all of which appeared to be in a state of inflammation; but one in particular was excessively tender, and felt quite hard when touched with the finger*. I stated to the patient my opinion, that this hard pile was the cause of the pain he endured, and that the removal of it was a highly probable means of giving him ease, and causing the other tumors to collapse. On the subsequent day I performed the operation in the following manner: Having secured the hard hæmorrhoid with a dissecting hook, and drawing it forward, I cut it off, with a curved pair of scissors, as close to its basis as I was able. The remainder of the tumors instantly collapsed, and withdrew within the sphincter; and, as they were quite soft, I did not think it necessary to search further for them. The pain the operation occasioned was much less than the patient had experienced for a long time after every motion. No hæmorrhage followed. I applied a compress dipped in a saturnine lotion over the anus, and bound it on with the usual T bandage. An uneasy sensation was experienced in the rectum during the whole of the first day, but the patient slept well in the night, and the following day was perfectly easy. On the third day he took a gently opening medicine, which procured him two loose motions. These were mixed with a small quantity of blood; but gave him very little pain as they came away, and were followed with a very slight protrusion of the gut, which went back immediately on the application of the finger. He had not any occasion to take medicines afterwards. The bowels in a short time performed their proper office without pain or protrusion, and he became quite well in every respect. For a year and a half he continued free from any uneasiness of the hæmorrhoidal kind; but then the gut began to have a slight tendency to protrude whenever he had a costive stool. He took particular care to avoid this by an attention to his diet, and by the use of gently purgative medicines. As this, however, did not hinder the gut from occasionally coming down, he was advised to take the size of a nutmeg of Ward's Paste every morning and evening. He had not taken this medicine long before the tendency to a prolapsus entirely went off, and for the last two years he has not had the least uneasiness in this part.

CASE II. "Mr. B., a wine-merchant in the City, applied to Mr. Wathen and me, during the time we were connected together in practice, on account of a considerable number of hæmorrhoids which had been troublesome to him many years; and, for some

* "It has been observed above, that hæmorrhoidal tumors are not unfrequently occasioned by a thickening of one or more of the plicæ or folds in the membrane which lines the inferior part of the intestinum rectum. I have reason to believe that this is much more frequently the cause of these tumors, than a varicose enlargement of any large blood vessel that is situated in this part."

months prior to the time of his consulting us, had often been so excessively painful, that, for hours after voiding his fæces, he was unable to move either from his bed or couch. On an examination I found the tumors very similar to those that are described in the preceding case. A considerable number of them was protruded through the sphincter ani; and, nearly in the centre of these was one, much smaller than the rest, which was excessively hard and painful, and very livid in colour. Having secured this hard tumor with a dissecting hook, we immediately removed it with a curved pair of scissars. No hæmorrhage followed the operation; and he became almost instantly easy. Nothing particular occurred in the subsequent treatment; and, from that period to the time of my drawing up this statement of his case, which is upwards of ten years, he had not had the smallest tendency to a return of the disorder.

CASE III. "Mr. D., a merchant in the City, about forty years of age, has been troubled with hæmorrhoids ever since he was seven years old; scarcely ever having had a stool, since this time, without the protrusion of one or more of them, which he has afterwards been obliged to return through the sphincter ani by the pressure of his fingers. They gave him, however, no further trouble till about three years ago, when, without any known cause, he was unable to keep them up, and they became so painful that he walked with difficulty; and in a short time the pain increased to so great a degree, that he could neither sleep nor continue long in any one posture. In this state he sent for me. The case exactly resembled those which I have related above. In the midst of a large number of hæmorrhoids, there was one much harder and darker coloured than the rest, and excessively tender when touched with the finger. I gave him my opinion that the whole of his pain proceeded from this hard hæmorrhoid; and advised him to have it removed. His consent was immediately given; and I cut it off, together with a small hæmorrhoid near it, which seemed somewhat harder than the rest, the same evening. The operation gave him very little pain, and was not followed by any hæmorrhage. He became easy almost as soon as it was performed, and afterwards passed a very good night. No hæmorrhage took place, nor did any accident follow; and in a few days he was well enough to return to his usual business. There is however, still, as there has been from his youth, a protrusion of part of the gut whenever he has a stool; but this he returns with great facility; and, as it gives him no further trouble, he is not uneasy about it.

CASE. IV. "Mr. B. applied to me, about twelve years ago, on account of an excruciating pain, produced by hæmorrhoids, which had then continued a week with scarcely any intermissions. On an examination I found, as in the preceding cases, in the midst of several hæmorrhoids, one much harder than the rest; which

though small was nearly black. I desired him to strain, that this black pile might become more visible through the sphincter ani; when touching it with the end of my finger, he immediately exclaimed that this was the part from whence his pain proceeded. Previous to the present attack, the patient had never been subject to any complaint of a similar kind, but had enjoyed in all respects a good share of health. I immediately removed the hard pile in the way above recommended; after which the pain very quickly abated. No hæmorrhage ensued, nor were any other dressings employed than the usual compress and bandage. Within a fortnight he was perfectly cured, and returned to his business. He did not experience any further trouble from this part till about twelve months ago; when he was again attacked with an agonizing pain similar to that he had before experienced; and a hard tender tumor was again protruded through the sphincter ani, together with a number of others of a softer nature. He was now at a considerable distance from me; in consequence of which I had not an opportunity of attending to him in this illness. The gentleman he consulted recommended a free use of sulphureous remedies, together with various softening ointments to be applied to the protruded tumors; but a month had nearly elapsed before he experienced any lasting amendment from them. The pain then gradually went off, and the hard tumor disappeared; since which time he has again enjoyed his usual health."

In this instance Mr. Ware thinks it probable that the removal of the hard hæmorrhoid would have prevented the patient a great part of the pain he endured, and have much shortened the time of his confinement from business.

CASE. V. "A lady who has borne many children, applied to me about three months ago, on account of a protrusion of hæmorrhoids through the sphincter ani, which occasioned her a continual uneasiness in this part. The disorder commenced about three years ago, and was supposed to have been brought on by some active medicines which she took about that period. For a long time the hæmorrhoids had been accustomed to bleed whenever she had a costive stool; and for a month before she consulted me, not a day elapsed, in which she had not lost six or eight ounces of blood in this way; notwithstanding which, there was very little diminution in her usual menstrual discharge. In consequence of the pain and loss of blood she was exceedingly reduced both in strength and size, and had entirely lost her inclination for food. On an examination I found, as above described, a considerable number of hæmorrhoids protruded through the sphincter ani; two of which appeared more prominent than the rest; but they were not more tender, and there did not appear to be any difference in their colour. I stated my opinion to the patient, that the removal of these prominent piles would be a likely means of causing the remainder to collapse, and

of restraining the hæmorrhage which had so frequently returned, and so greatly weakened her. The next day I performed the operation. Having secured the tumors with a common hook, I cut them off with a curved pair of scissars, as close to their bases as I was able. The hæmorrhage that followed was really trifling, and the gut immediately retracted within the sphincter. A thick compress dipped in cold brandy and water was immediately applied, and the patient was directed to lie cool in bed, and to avoid hot drinks of every kind. She continued perfectly easy until the evening of the following day, when, having an inclination for a stool, she voided a considerable quantity of grumous blood without any mixture of fæces. The nurse who attended her was so much alarmed by its appearance, that she wished to send immediately for me; but the patient would not permit it, assuring her that for many days previous to the operation she had voided as large a quantity of pure blood. The next morning she took a table spoonful of castor oil, which procured her two loose stools, without the least mixture of blood, or the smallest protrusion of the intestine. The precaution I at first gave her to avoid hot drinks, and to lie cool in the bed, was strictly regarded. She had a stool every day afterwards without the need of any medicine to procure it; and at the end of a fortnight every symptom of the disorder was perfectly removed.

CASE VI. "Mrs. H., about four years ago, had occasion to take a purgative medicine, which unexpectedly operated with great violence. In consequence of this, whenever she had a stool afterwards, a part of the internal membrane of the rectum was protruded through the sphincter ani, requiring the application of the fingers to return it to its proper position; and in a short time the gut became so weak, that it came down whenever she walked the distance of a hundred yards. She was not unfrequently also troubled with a considerable hæmorrhage from this part, which sometimes came on suddenly, and occasioned her great distress. Many remedies, both external and internal, had been made use of, but without affording her any relief. I at first suspected that this was one of the common cases of hæmorrhoids; and, as the patient was constitutionally costive, I directed her to take the size of a nutmeg of an electuary composed of sulphur and cream of tartar mixed with lenitive electuary, once or twice every day, according as the state of her bowels made it necessary. An ointment composed of equal parts of the powder of oak galls and elder ointment was also prescribed to be applied, morning and evening, to the protruded gut. These remedies, however, did not produce any good effect. She was then advised to introduce up the gut the end of a small candle, about two inches long, and as thick as the little finger, once or twice every day, in order by its pressure to hinder the protrusion, and, in this way, to give strength to the weakened part. A thick compress at the same time was confined on the anus

by a T bandage, which was bound on the part as tight as it could be borne, without giving pain. These applications seemed at first to have a good effect in keeping up the gut; but in a short time, the benefit they afforded ceased, and the introduction of the candle, and wearing the bandage, became a work of so much fatigue, that the patient could not be prevailed on to continue the use of them. I was now permitted to examine the seat of the disease, and I found the posterior and inferior part of the rectum protruded through the sphincter ani, about the size of the first joint of the little finger. There did not appear to be any distinct tumor in this part that could properly be denominated an hæmorrhoid; but the resemblance between the two disorders was so strong, and the distress of the patient so great, that I thought myself fully justified in recommending the excision of the protruded part, in the same way in which I would remove an inflamed hæmorrhoid. The patient giving her consent, I performed the operation on the following day. Having secured the most prominent part of the tumor with a hook, I cut it off in the usual way with a curved pair of scissors. The hæmorrhage that ensued was very inconsiderable; and the gut immediately returned to its proper position. I covered the part with a cold saturnine lotion, and bound it on with a T bandage. About two hours after the operation the patient felt an uneasiness in the rectum as if she should have a stool; and shortly afterwards a large quantity of thick blood was brought away. This much alarmed both the patient and her friends, and occasioned them to send in haste for me; their alarm being increased by a return of the hæmorrhage before I arrived. I immediately applied a doffel of lint dipped in a strong vitriolic lotion to the wound, and repeated the use of a thick compress dipped in a cold saturnine lotion to the external part of the anus. A bolus containing five grains of dragon's blood, and an equal quantity of alum, was given every two hours; the weight of the bed clothes was lessened; and hot drinks of every kind were carefully avoided. No hæmorrhage of any consequence took place after this plan was adopted. It was steadily continued for twenty-four hours; the compress being frequently dipped, during this time, in the cold saturnine lotion. The bolusses were afterwards given every four hours for another day. On the third the patient took some castor oil, which brought away a loose stool with a small mixture of blood, but without any protrusion of the gut. She had a slight sense of soreness in the wound for about a month; but then the pain wholly went off; and from that time to the present, which is upwards of three years, she has enjoyed her health perfectly in every respect."

We cannot conclude this section without strongly recommending to the young practitioner a trial of this improved mode of excision in cases of the hæmorrhoids requiring that kind of treat-

ment; though the milder remedies suggested under MEDICINE may be resorted to in less urgent cases.

SECT. II. Of CONDYLOMATOUS EXCRESCENCES, &c. of the ANUS.

EXCRESCENCES are sometimes produced about the anus, which from their figure get the name of *fici*, *arista*, &c.; but they are all of the same nature, and to be cured by the same means. They sometimes grow within the gut itself, but more frequently are situated at the verge of the anus. They vary considerably in their colour, figure, and consistence. Sometimes they are only one or two in number, but commonly all the skin about the anus becomes covered with them. They vary in size from that of ordinary warts to that of split garden beans. They seem originally to be productions of the skin, though at last they sometimes proceed as deep as the muscles. - They frequently remain long without producing much uneasiness. When this is the case, they ought not to be touched; but sometimes they become so troublesome as to render their removal necessary.

The softer kinds may frequently be removed by touching them daily with a pencil dipped in tincture of muriated iron, or rubbing them often with gentle escharotics, as crude sal ammoniac, or pulvis fabinæ; but the harder kinds are to be removed chiefly by lunar caustic, or by the knife; the latter of which is greatly preferable, and may be done with the utmost safety.

The sores are afterwards to be treated like wounds produced by any other cause. If caustic is to be used, care ought to be taken that it do not injure the rectum.

SECT. III. Of the FISTULA IN ANO.

THE FISTULA IN ANO is a sinuous ulcer in the neighbourhood of the rectum. When it opens externally, and has likewise a communication with the gut, it is termed a *complete fistula*; but if it has no communication with the rectum, it is called *incomplete*. When the ulcer communicates with the gut, but has no external opening, it is named an *internal* or *occult fistula*. It is likewise distinguished into simple and compound. The first is where one or more sinuses communicate with the internal ulcer, but where the parts in the neighbourhood are sound. The compound fistula is where the parts through which the sinus runs are hard and swelled, or where the ulcer communicates with the bladder, vagina, os sacrum, and other contiguous parts.

Causes.] The causes producing the disease may be, whatever tends to form matter about the anus, piles, condylomatous tumors, hardened fæces, or any cause which produces irritation and inflammation, so as to end in suppuration.

Treatment.] As soon as a swelling about the anus appears to terminate in suppuration, every thing ought to be done which can accelerate the formation of matter. A proper degree of heat, warm poultices, fomentations, and the steams of warm water, are the means best suited for this purpose; and as soon as matter is formed, it ought to be discharged by a free incision in the lowest part of the tumor. Much depends upon the proper treatment here; for if the opening be made too small, or if long delayed, the matter gets into the loose cellular substance, and instead of producing one, produces many sinuses, and these sometimes running to a great depth. The parts ought then to be covered with soft lint spread with mild ointment, and an emollient poultice kept constantly over the whole. By this any remaining hardness will be removed, the cavity will fill up like imposthumous tumors in other parts, and a complete cure will in general soon be made.

It more frequently happens, however, that the practitioner is not called in till the abscess has burst of itself, and till matter has insinuated into the surrounding cellular substance, and formed one or more real fistulæ.

The first thing to be done now is to *discover the real course of the different sinuses*, and the probe is the best instrument for this purpose. If there be openings in the external surface, there is commonly little difficulty in this. If they run along the perinæum or the muscles, the probe will generally detect them. If they follow the direction of the gut, the best method is to introduce the fore finger oiled into the rectum, while the probe is entered at the external orifice. If there be a communication between the gut and the sinus, the probe may be made to pass till its point is felt by the finger in the rectum. We discover with certainty if a sinus communicate with the gut, when air or fæces are discharged, or when any mild fluid injected returns by the anus.

After the course of the sinus has been discovered, the method of cure is next to be considered. Astringent or escharotic injections, pressure, and setons, are formidable, on account of the violent pain which they produce. The only method therefore of bringing on a proper degree of inflammation is a free incision along the whole course of the sinus. The course of the different sinuses having been previously discovered, a laxative ought to be given on the day preceding this operation, and a clyster an hour or two before performing it. The patient is to be placed with his back towards a window, while his body leans upon a bed, table, or chair. The finger of the surgeon is to be rubbed over with oil, and introduced into the rectum. The end of a crooked probe-pointed bistoury

(fig. 80) is then to be passed into the fistula, and pushed against the finger in the rectum, if the fistula be complete. But in cases of incomplete fistulæ, the point of the instrument must be made to perforate the gut before it can reach the finger. Some make the perforation with a sharp-pointed bistoury, which can be made to slip along the side of a probe-pointed one, as at fig. 81. After the bistoury has reached the cavity of the rectum, the point of it is then to be brought out at the anus, and a cut made downwards to lay the sinus completely open. In this operation the sphincter ani muscle is commonly cut, if the sinus be high; but no inconvenience is found to arise from this circumstance. It sometimes, though rarely, happens, that the sinus goes beyond the reach of the finger, and even as high as the upper end of the sacrum. The only thing which can be done in this case is to cut as high as the finger can go, so as to give a free and easy vent to the matter.

Some practitioners, with a view to prevent troublesome hæmorrhagies, and others to free the patient from the dread of the knife, have proposed to open the sinuses by means of ligature (Plate III. fig. 82). By introducing one end of a piece of silver or leaden wire into the sinus, then bringing it out at the anus, and twisting the ends together, the contained parts may be so compressed as to produce a complete division of them. But this is both more painful and tedious than the scalpel, and appears to be by no means preferable.

When the presence of an *occult fistula* is suspected, its existence ought first to be fully ascertained, by examining whether the matter which is passed by stool proceeds from an ulcer in the bowels or from an abscess at the side of the anus. It is discovered by matter from the bowels being mixed with the fæces, and no pain about the anus. In an occult fistula, a hardness, swelling, and discoloration, are observed upon some spot near the anus, and there is a sensation of considerable pain upon pressure being made upon it. The operation in this is the same with that in the other two varieties of the disorder; only that an opening is previously to be made, by a lancet or scalpel, in that spot where the matter appears to be lodged. By this the fore will be reduced to a complete fistula, and the rest of the operation will be easily performed.

Treatment in the compound fistula.] In this manner the different sinuses are to be operated upon, when in a simple state; but in those of a *compound nature*, where the parts in the vicinity of the sores have been separated from each other by an effusion of matter into the cellular substance, and where all the under end of the rectum has, in some rare cases, been detached from the surrounding parts, two modes of operating have been recommended; either to remove a portion of the external integuments, so as to give free vent to the matter; or to extirpate all the lower end of the rectum which is found to be detached from the surrounding parts. But

from the pain and subsequent distress which they occasion, these methods are judiciously laid aside. All that is necessary to be done here is to lay the detached portion of gut completely open, as in cases of simple fistulæ; but if this be insufficient for allowing the gut to apply properly to the contiguous parts, another incision should be made on the opposite side. If the neighbouring bones be found sound, and the constitution in other respects be unimpaired, a complete cure will probably be obtained.

The matter sometimes insinuates itself between the skin and muscles of the perinæum, or of the hip. When this is observed, the sac produced by it should be laid open from one end to the other by one or more incisions as circumstances may require. Sometimes, from neglect or improper treatment, the matter collected does not find a proper outlet, and then the parts most contiguous to it inflame, become painful, and gradually acquire such a morbid callosity as to put on a scirrhus appearance. In such cases a cure may be effected by giving free vent to the matter, preventing every future collection, and inducing and preserving a suppuration in the substance of the parts chiefly affected. To accomplish this last circumstance, however, it may sometimes be necessary not only to lay the sinuses freely open, but to cut upon the indurated parts.

Subsequent treatment.] The different sinuses having been laid open, care must be taken to apply the necessary dressings. Upon this much of the success attending the operation depends. Dry lint, till lately, was much used by practitioners; but it has been found to produce so much irritation, especially when too much crammed in, as to be one of the causes of that diarrhœa which is frequently so troublesome after operations of this kind. Instead, therefore, of this sort of dressing, pledgets of lint, or soft old linen spread with any simple ointment, are to be preferred. After the sores have been cleared from clotted blood, the pledgets are to be gently insinuated between their edges, but not to such a depth, or with such force, as to give any uneasiness. This being done, and a compress of soft linen with a T bandage being applied over the whole, the patient is to be carried to bed; and the dressings being renewed, either after every stool, or, when these are not frequent, once in the twenty-four hours, the sores will generally fill up from the bottom, and will at last cicatrize in the same manner as wounds in any other part of the body. Sometimes, however, they acquire a soft, flabby, unhealthy aspect, and the matter discharged from them is thin, fetid, and occasionally mixed with blood. These appearances may sometimes arise from some part of a sinus having been overlooked. In this case advantage may follow from the part being laid completely open. But it more usually proceeds from some affection of the general system; and till this is eradicated the sores cannot be expected to heal.

In the cure of sores in other parts of the body, practitioners have

sometimes found great advantage to arise from the use of issues. The same thing is now found to be applicable here. Wherever therefore fistulæ are of long standing, while any disorder existing in the constitution is properly attended to, practitioners recommend, that an issue, in proportion to the quantity of the matter discharged by the fores, should be immediately employed. In this way, if the bones in the neighbourhood are not diseased, there will be reason to expect that a complete cure will be obtained.

Improved operation.] In 1789, an experienced and successful method of treating the *Fistula in Ano*, was communicated by Dr. Mudge, of Plymouth, in a letter to Dr. Lettsom.

The ingenious writer, solicitous to remove every embarrassment that may attend the operation for the *Fistula in Ano*, or the laying open, in a masterly manner, and consequently the cure of sinous ulcers burrowing in the fat surrounding the rectum, invented a *speculum ani*, by means of which the difficulty of coming fairly at the part is effectually obviated.

“Formerly,” says Dr. Mudge, “when a sinus running upon, or in the neighbourhood of the rectum was to be laid open, the generality of surgeons contented themselves with doing it at random, with the probe scissars; an imperfect, and therefore frequently an unsuccessful mode of operating.

“Cutting also, on the common director, in a part so confined and the necessary subsequent dressings to a wound so difficult of access, were attended with uncertainties, and embarrassments, which entitled the operator to little better hopes of success.

“Mr. Pott, indeed, with his usual skill and sagacity, simplified, and greatly improved the old mode of operating; and the success frequently attending his method, is a proof of its superior merit; however, I think even his mode of operation capable of great improvement.

“When, therefore, sinuses, which run into, or burrow on, the fat surrounding the rectum, are to be laid open, and afterwards treated with proper dressings. I have many years, and with uninterrupted success, adopted the following method:

“First then, in order to see clearly and distinctly the parts to be operated upon, I have found some sort of specula absolutely necessary; but those I have employed, are of a very simple construction: they are not unlike the gorget used in cutting for the stone, except that they are not so taper, and without the beak; (see Plate V.). The first and largest, is subservient to the knife; the other, and smaller, is for facilitating the application of the subsequent dressings. In order, therefore, to lay open a sinus, in its whole extent and direction, the patient ought, in order to empty the rectum, the evening preceding the operation, to take a dose of rhubarb; then being placed in a proper situation, which will be found that of kneeling upon, not against, the side of a bed; his body

should be inclined forward and downward, sufficiently so to spread the buttocks. If the sinus is on the left side of the intestine, the fore finger of the left hand being first oiled, is to be introduced its whole length into the anus and rectum; and then the concave part of the large speculum, oiled also, being placed upon it, is under that direction to be gently introduced almost its whole length, but so, that by pressing the end of it against the finger, the rectum may not be injured by any corrugation of the intestine, between the instrument and finger. The speculum being in the rectum, and the finger withdrawn, gives a fair view of the gut, provided the patient is placed advantageously for the light, to an extent of nearly four inches. A director is then to be introduced into the sinus, the end of which, if it perforates the intestines, will be seen; or, if it does not, will be felt; and the cavity must be laid open its whole extent, with a straight-edged knife. This being done, a dossil of dry lint should be applied with a probe between the lips of the wound, the whole extent of the incision, and the speculum withdrawn; which will leave the dressing, provided the probe is kept upon it till then, in its proper place, with the lips of the wound closed upon it. On the succeeding dressing of the next day, the finger is again to be introduced, accompanied with the smaller speculum, still bearing on the opposite side of the rectum; when, if the patient has not had an intermediate stool, the dressing will be found in its place, and the wound seen in its whole extent.

“ The consideration now, is the giving the wound a good surface, by the removal of callosities: this purpose is effectually answered by dipping a hair pencil in butter of antimony, and lightly touching, or smearing expeditiously, the whole wound, and its edges, therewith; which, by the assistance of the speculum, will be done at the expence of a momentary pain, and with the utmost convenience and precision. Dry lint is then again to be placed into, and between the edges of the incision, and the speculum withdrawn as before.

“ After the next dressing or two, a slough will be thrown off, about the thickness of shammy leather; when the surface of the wound will be found rather unfavourably smooth; but in a day or two after, by the use of a præcipitate medicine, the whole will have a proper granulating surface, and the wound usually heals rapidly, without any intervening impediment. I need not observe that, excepting the incision, and the application of the caustic, both of which are momentary matters only, the whole is attended with so little pain, that the dressing speculum, after introduction, is generally held by the patient himself. I usually carry the specula in my side pocket, that the patient may not feel them disagreeably cold; and it may be necessary to observe, that they should always be oiled before their introduction.

"An horizontal position of the trunk, during the cure, will be found to expedite it."

Dr. Mudge avoids enlarging upon the superior advantages of the above mode of treating the fistula in ano; and thinks, as we do, that they will be apparent to every operator.

We shall conclude this section with the following *case of fistula in ano, from an uncommon cause*. The account is given by Dr. Harrison, and appears in the Memoirs of the Medical Society of London.

"On the 25th of June, 1793," says the doctor, "I was desired to give my opinion in the case of Mr. Baldock, a carpenter, aged about 40 years, who had for several months been troubled, as he said, with a fistulous ulcer at the back part of the fundament, a little above the *sphincter ani*. Notwithstanding the inflammation and increased thickness in consequence of it, I could pass a probe in an ascending manner towards the rectum, upwards of an inch, with great ease. Here the sinus appeared to terminate; nor could I get the probe any further, although I made repeated efforts to push it into the intestine, with which I suspected a communication. Having put the patient to some pain, I desisted from further trial, and desired him to examine his *faces* to see whether they were mixed or streaked with purulent matter. The next stool ascertained the existence of pus, and determined me to make another attempt to find a passage into the rectum. When I had again reached the place, where the probe formerly stopped, I urged it with a greater effort, and the obstruction giving way, the instrument passed without further trouble. I was sensible when it penetrated the resisting body, which at the time appeared to me like the *os unguis* of the ethmoid bone. This I mentioned to the gentlemen present, and afterwards we all perceived the grating against an hard brittle substance as the probe was passing into, or withdrawing from, the rectum, with which a communication was then open. In a few days the operation for a fistula was performed in the usual manner, a little above the *sphincter ani*; and, upon taking away the dressings on the third day after, we were surprised to find the core of an apple or pear among them. This brought to my recollection the circumstance that occurred on examining the wound previously to the operation, and which I could not account for at that time. After washing the core we could clearly perceive where it was broken by the probe in its passage to the rectum. The wound healed in a short time, and the patient has ever since enjoyed a good state of health. When I enquired more particularly into what could occasion such an unusual *phenomenon*, he replied, that about eight months before I was consulted, he remembered to have eaten two or three apples, but could not recollect whether he swallowed the cores or not. He was confident that he had never tasted either apples or pears at any subsequent period. The

disorder had continued about thirteen weeks, when the operation was performed; and therefore originated in a cause that must have existed at least eight months before.

“Many diseases are occasioned by taking into the stomach matters that escape the solvent powers of the gastric juice. These, by acting as nuclei, or by stimulating the intestines in their progress towards the *anus*, have laid the foundation of various complaints, which afterwards baffle the skill, and resist the practice, of the most able physicians. Authors have recorded such a long catalogue of these cases, that it may appear unnecessary to add another to the list; but, as far as my reading enables me to judge, no one has enumerated the cores of apples or pears among the causes of *fistula in ano*; and as it is an opinion, with many, that the kernels of fruit contribute materially towards digestion, it appears of consequence to publish every fact that is calculated to remove this unhappy prejudice.

“That inflammation and suppuration of the intestines may arise from the mechanical stimulus of an apple-core, will be readily admitted; nor shall we find more difficulty in accounting for its acting as a cause of *fistula* in this case. After being received into the stomach, it would be carried with the other indigestible matters into the intestines, where the peristaltic motion would gradually urge it towards the *anus*. During this progress, the *feces* acquire a greater consistency, and, before expulsion, they often become so hard and firm as to require no small straining to force them through the ring. Such strong efforts are sufficient to impel any hard and rugged body against the rectum, and especially where it is surrounded by the *sphincter ani*, with force enough to bruise and enter the substance of the intestine. When once lodged there, the ordinary inclinations to go to stool, and irritations from the offending substance, will be more likely to thrust it further into the coats of the gut, than change its direction towards the *anus*. Inflammation and suppuration, the natural consequences of such a process, when they attack the lower part of this intestine, are commonly followed by sinuous openings about the fundament. In this manner I account for the origin of *fistula in ano* in the present case; and heartily wish the recital of it may operate to discourage the too prevalent custom of swallowing the indigestible cores, or kernels of fruit, along with their esculent and soluble parts.”

SECT. IV. Of PROLAPSUS ANI.

This is a protrusion of part of the rectum beyond the anus. It is often occasioned by debility of the parts, but is most frequently owing to violent exertions made in the rectum in consequence of irritation. The reduction should be effected as soon as possible;

for although this part of the intestine can bear exposure to air much longer than any of the rest, yet allowing it to remain a long time out would be attended with great uneasiness, and probably with danger. In the reduction, the tumor ought to be supported with the palm of one hand, while with the fingers of the other the part of the gut last protruded is to be returned. If the gut has been long exposed previous to the reduction, venæsection may become necessary, and gentle astringents may be applied to the part; such as a decoction of cinchona or of logwood. The patient during the reduction is to be kept in a reclined posture. As soon as the bowels are returned, a proper bandage (fig. 83) is to be applied. Such remedies are afterwards to be exhibited as most tend to recover the tone of the parts; and lotions of alum water, or a solution of vitriolated zinc, may be employed outwardly.

SECT. V. *Of IMPERFORATED ANUS.*

This disorder, though not frequent, now and then occurs; and when present, unless speedy relief be given, must prove fatal. In some cases, the end of the rectum protrudes at the usual situation of the anus, and is only covered with the common integuments; but in others, no termination of that gut is discoverable. Sometimes the rectum ends within an inch of the usual seat of the anus; at others, it reaches no further than the top of the sacrum. In some cases it terminates in the bladder; in others, in the vagina. In the most favourable cases, where the rectum protrudes, an opening may be readily made by a scalpel or lancet; but when no direction of this kind is met with, an incision is then to be made in the place where the anus is usually situated, and is to be continued in the direction of the os coccygis and sacrum, which is the course the intestine commonly takes. The finger is to be used as a director along it; the parts are to be cut either till feces are observed, or till the incision has been made the length of the finger. If still the feces do not appear, a lancet-pointed trocar is to be pushed forward upon the finger in such a direction as the operator thinks will most probably reach the gut. An artificial anus is likewise to be attempted, where the gut terminates in the bladder or vagina. After the operation, the greatest attention is necessary to preserve the opening which has been made. Substances which irritate least are the most useful; such as dossils of lint moistened in oil, and rolls of soft bougie plaster.

CHAP. XXXIII. OF LUXATIONS.

SECT. I. *Of LUXATIONS in general.*

A BONE is said to be *luxated* when that part of it forming a joint is moved out of its place. When the bone is forced entirely out

of its cavity, the luxation is termed *complete*; when this is not the case, it is *partial* or *incomplete*. When there is also a wound of the soft parts communicating with the joint, it is called a *compound*, and when there is no wound, a *simple luxation*.

Symptoms.] The common symptoms of a dislocated bone are, inability to remove the injured limb; pain, tension, deformity in the part affected; and sometimes inflammation, subultus tendinum, and fever: and these three last are greatest in partial dislocations. The swelling which first appears is always inflammatory; but afterwards a secondary swelling comes on, seemingly œdematous, and probably owing to the pressure of the lymphatics by the dislocated bone.

Prognosis.] In judging of the practicability of reducing a luxation, we ought to attend to its nature and extent, the other circumstances with which it may be complicated, and the length of time which it has continued. When a bone is only partially dislocated, it is evident that it may be reduced with much more ease and certainty than where it is completely displaced. It is evident also that fracture attending dislocation must render reduction much more difficult and uncertain. Indeed, when both the bones forming the joint are broken, there is the greatest hazard of its remaining stiff during life, even when the greatest attention has been paid. Luxated bones are most easily reduced immediately after they are displaced: the difficulty indeed of reducing them is generally proportional to the time that has intervened since the accident happened. When a bone has been some time lodged among the contiguous muscles, it forms a socket for itself, and is firmly grasped by the surrounding soft parts. The cavity, too, from which it was dislodged may be partially filled with some of the surrounding soft parts, or at least diminished by the constant action of the contiguous muscles on its cartilaginous brim. Dissections, however, shew, that inspissated synovia does not, as was formerly supposed, fill up this cavity. In delicate constitutions and advanced periods of life, when the muscles give little resistance, dislocations are more easily reduced than in the vigour of youth or in robust constitutions.

Treatment of simple luxations.] In the treatment, we ought, 1. To remove the dislocation with as much ease and expedition as possible; 2. Retain the bone in its situation till the parts have recovered their tone; and, 3. Obviate all uneasy symptoms.

(1.) When the surrounding skin and muscles are much contused and inflamed, we should endeavour to remove the inflammation by local bleeding, saturnine applications, and laying the limb in an easy posture, before we attempt to reduce the bone, as considerable injury may be done by stretching a limb while the parts surrounding the joint are inflamed. The upper part of the limb should be kept steady while the surgeon endeavours to replace the under bone,

which alone is commonly displaced. This is not easily done; for the contractile power of the muscles acts strongly against every attempt, and not only draws it beyond the contiguous bone against which it should be placed, but frequently forces it out of its natural situation, and fixes it firmly in some neighbouring cavity, from which it is with difficulty removed. To prevent this resistance as much as possible, the muscles ought to be put into a state of relaxation. If this is properly done, the force necessary for reducing a luxated bone may generally be obtained by assistants alone; sometimes, however, machinery is required, and various instruments have been invented for this purpose. Freke's machine is the most generally used. The force ought always to be applied in a gradual manner, and to the dislocated bone alone, and not to any more distant parts of the limb. After the end of the dislocated bone is brought into a line with that to which it is opposed, the reduction is easily completed, either by the action of the muscles alone, or, if that is not sufficient, by gentle pressure.

(2.) After the reduction there is seldom any difficulty in retaining the bone in its place, unless it has often been dislocated before. All that is necessary is to place the limb in a relaxed posture, and to support the bone with a bandage till the parts have recovered their tone.

(3.) The most urgent symptoms which accompany dislocations are, pain, inflammation, and swelling. These usually abate soon after the reduction. If any degree of inflammation remain, the use of leeches is the best remedy.

Treatment of compound luxations.] When dislocated bones are accompanied with fracture near the joint, the fracture must be allowed to heal before reduction be attempted. This, however, is not always necessary in very small bones, as those of the fingers. When the fracture is at a distance from the joint, the dislocation may generally be reduced immediately. Compound luxations are to be treated nearly as compound fractures. After the bone is replaced, leeches should be applied to abate the inflammation; after which the fore should be dressed with Goulard's cerate, or any other mild ointment, and the pain moderated by opiates and a low regimen: care ought also to be taken that no matter lodge about the joint. When luxations are produced by tumors or collections of matter in the neighbourhood of the joints, they may be considered as incurable: when they proceed from too great a relaxation of the ligaments and tendons of the joint, the bone can hardly be prevented from being now and then displaced; but the inconvenience may be somewhat obviated by supporting the limb with a proper bandage, by the use of the cold bath, and by electricity.

SECT. II. LUXATIONS of the BONES of the HEAD and NECK.

If the bones of the cranium be separated by external injury, all

that can well be done is, to support the parts by a bandage, to prevent inflammation, to keep the patient quiet, and in a proper posture, during the cure. The bones of the nose are seldom luxated without fracture; when they are, the injury is easily discovered by the touch. When one of the bones is driven inwards, it may be raised and reduced by pushing a tube of a proper size, and covered with soft lint, into the nostril; which may be afterwards retained till there is no danger of the bone being again displaced. If the bone be luxated outwards, it may be reduced by the fingers, and retained by a double-headed roller. The *lower jaw* is luxated most frequently when the mouth is opened widely; it can only take place forwards and downwards, being there least surrounded by the neighbouring parts: both sides are generally luxated at once; and in that case the mouth is opened wide, the chin thrown forwards and towards the breast. When only one side is dislocated, the mouth is distorted, and widest on the sound side of the jaw, which is drawn a little towards the contrary side. The patient should be seated, and his head supported. The surgeon should push his thumbs, projected by a covering of strong leather, as far as possible between the jaws, and then with his fingers, applied on the outside of the angle of the jaw, endeavour to bring it forward till it move a little from its situation. He should then press it forcibly down, and the condyles will immediately slip into their place. The thumbs ought to be instantly withdrawn, as the patient is apt to bite them involuntarily. The patient should for some time avoid much speaking or opening his mouth wide.

The result of the following case, published by Mr. Cowley, in the Medical and Physical Journal, serves to shew the propriety of our attempting to afford relief in those cases where the repeated endeavours even of the most experienced in the profession have been defeated. The author relates it in the following words: "James Flocker, aged 29, of low stature, but of robust make, was admitted into St. Thomas's hospital on Sept. 25, 1800, with a luxation of the jaw. He said, on the 27th of August last, he retired to bed at his usual hour, in health; but at three o'clock the next morning, he awoke with a violent pain in the face, attended with much stiffness, and the mouth in an open, fixed state. The same day he applied to two surgeons for advice, who both agreeing that it was a luxation of the jaw, attempted its reduction repeatedly, without success: the patient remained under their care three weeks; but receiving no relief, he left the country for town, and on the above day applied at St. Thomas's hospital, with an evident luxation of the jaw; yet, in other respects, apparently in health. His appetite was good; pulse full and regular; the muscles of the face in a state of rigidity; and his mouth sore from the treatment he had received; so that the introduction of the finger was attended with much pain. Under these circumstances, I considered much de-

pended on my first attempt; and Mr. Birch (the surgeon under whose care he was admitted) having advised me to effect as complete a relaxation of the parts as possible, before any means were used for its replacement, I applied five leeches on each side of the face, in the direction of the masseter and temporal muscles, which having dropped off, the after hæmorrhage was much increased by placing the patient in the warm bath at 98° , which was gradually increased to 106 degrees of heat of Fahrenheit's thermometer. After the patient had been in twenty minutes, his pulse sunk, became irregular, and shewed symptoms of syncope; at this juncture (the patient remaining in the bath) I attempted to press on the jaw with my thumbs covered, but finding it impossible to act with advantage in this manner, I removed the incumbrance, and introduced them unarmed and pressing on the jaw as far back as possible, beginning with a slight pressure, slowly adding the force requisite, I continued the extension downward, with a slight inclination forward, for ten minutes; at this time I tried to force back the jaw, and evidently perceived it to be altered in its situation; but on its producing some pain, the patient forced himself from my hands, and the fossæ receiving the condyles of the jaw, being in a great measure filled up with an extravasated substance (this I consider to be the fact, from the jaw not slipping into its place suddenly, as is generally expected in these accidents), it resumed its wrong situation with the greatest facility. At this time his pulse began to increase, both in strength and fulness; I therefore immediately renewed my extension as before, and having continued it for ten minutes, again pressed backward, and had the satisfaction to see it properly reduced. The parts were now secured by a bandage, and the patient retired to bed.

26th. He complains of pain in the direction of the temporal muscles, his pulse weak, soft, and slow; the symptoms of irritation are not however so great as expected, so that a confinement to bed is unnecessary; he took an aperient draught this afternoon.

27th. His pulse is increased in strength and fulness; the draught procured him three motions, which gave great relief; from this time he may be considered as in perfect health, capable of masticating solid food, and in every other respect as well as before the accident. October 9, he was sent out of the hospital, cured."

When *the head is luxated*, it commonly falls forward on the breast, the patient is instantly deprived of sense and motion, and soon dies if the luxation be not quickly reduced. In reducing the luxation, the patient should be placed on the ground, and supported by an assistant: the surgeon standing behind should gradually pull up the head, while the shoulders are pressed down by the assistant till the bones are brought into their place, which is known by a sudden crack or noise; if the patient be not dead, he immediately recovers his faculties, at least in some measure. He should then be put to bed with his head elevated and retained in one pos-

ture. He should lose a quantity of blood, and live for some time on a low diet.

SECT. III. LUXATIONS of the SPINE, OS COCCYGIS, CLAVICLE, and RIBS.

The vertebrae are sometimes partially, but hardly ever completely, dislocated without fracture. When these occur high up, they are attended with the same symptoms as dislocation of the head: when further down, besides distortion of the spine, paralysis ensues of every part of the body situated under the luxated bone; there is commonly also either a total suppression of urine, or it is discharged involuntarily together with the faeces. As luxations of this kind are generally owing to falls or violent blows, the vertebra is driven either forwards or to one side; it is therefore very difficult to reduce it. The best, as well as the simplest method, is to lay the patient on his face over a cylindrical body, as a large cask, and at the same time to attempt to replace the bone with the fingers. If the bone be very much displaced, there is very little reason to hope for success. The *os coccygis* is more liable to dislocation than any other part of the spine. It is sometimes forced outwards in laborious births. This is discovered by the great pain which is felt at the connection of the *os coccygis* with the sacrum, and by the bone appearing to be displaced when examined. It may generally be easily reduced by pressure with the fingers. The best support afterwards is a compress, with the T bandage. When the coccyx is luxated inwardly, the patient complains of severe pain, tenesmus, and a sense of fulness in the rectum; the faeces are passed with difficulty, and in some cases a suppression of urine takes place. The injury is easily discovered by introducing the finger into the anus. In this case the bone should be pressed outwards by introducing the fore and middle fingers of one hand, dipped in oil, into the rectum, and supporting the parts which correspond with it externally till the reduction is accomplished. Dislocations of these bones are apt to excite inflammation, which often terminates in dangerous abscesses; it ought, therefore, to be guarded against by every means in our power.

The *clavicle* is most frequently luxated at its junction with the sternum; because the violence which produces the injury is generally applied to the shoulder. The luxation is discovered by pain in the part, by the projection of the bone, and by the immobility of the shoulder. It is easily reduced by pushing the bone into its place with the fingers, while an assistant draws back the arms and shoulders. It is not so easy to retain the bone in its place. When it is the inner extremity of the clavicle which has been dislocated, the shoulder should be kept in its natural situation,

neither raised nor depressed: the fore-arm should be supported, as should also the head and shoulders, and a moderate pressure should be made upon the displaced end of the bone. For this purpose the machine represented fig. 84 in Plate III. the invention of Mr. Park, of Liverpool, answers best. But when the outer extremity of the clavicle has been dislocated, the shoulder must be considerably raised, the arm supported in a sling, and the bone kept in its proper situation by a small compress placed over its end, and secured by a roller forming the figure 8; or it may be retained by the machine above mentioned. The bandage ought to be retained for a considerable time.

Luxations of the *ribs* are exceedingly rare. The symptoms are nearly the same as those arising from fracture, only that the pain is more severe at the articulation, and that no other spot but that will yield to pressure. All that can be done is to bend the body forward over a cask, or some such thing, in order to assist the viscera in pressing out the rib. Bandages are of little use. The patient should be kept quiet, and fed on a low diet: inflammation should be prevented, and opiates given if he have a troublesome cough.

SECT. IV. LUXATIONS of the BONES of the SUPERIOR EXTREMITIES.

The head of *the os humeri* is most frequently dislocated forwards and downwards, sometimes downwards and backwards, but never upwards, without a fracture of that part of the scapula which is placed above the joint. The luxation is discovered by the patient's inability to raise his arm, by violent pain attending the attempt, by the luxated arm being of a different length from the other, by the head of the humerus being felt out of its natural situation, while a vacuity is perceived under the acromion, and by the flatness of the injured joint, while the sound one has its natural fulness. When the luxation is of long standing, the whole arm is apt to become cedematous.

The patient should be seated on a chair, and his body secured by a broad belt passed round it, and held by assistants. The elbow should be bent, in order to relax the muscles on the fore part of the luxated joint. A firm leather belt four or five inches broad, with strong straps, and lined with flannel, is to be tied round the arm immediately above the elbow: assistants are to extend the arm gradually, by pulling these straps, while another assistant draws back the scapula. The surgeon stands on the outside of the arm, directs the assistants, and varies the direction of the extension, according to the situation of the head of the bone. As soon as the head of the bone has cleared the brim of the socket, the muscles

draw it into its place, a crack is heard, the patient is relieved, and the inferior part of the shoulder acquires its usual fulness.

Various *other modes* of extending the arm have been proposed in difficult cases; as, suspending the patient by the luxated arm over the step of a ladder or the top of a door, raising him up by the arm with ropes running over pulleys fixed in the ceiling of a room, &c. The jerk produced by the body being suddenly raised and let down again on a feather bed, has sometimes succeeded when other means have failed. A gentler method is to lay the patient on the floor, while two or three stout men standing on a table lay hold of him by the arm and pull him up. But all these methods are in danger of lacerating the soft parts by the suddenness with which the force is applied, and even sometimes of breaking the end of the humerus if it be pressed against the neck of the scapula. Mr. Freke's improvement on the ambé of Hippocrates, has been considered as the best machine for extending the arm. But machinery is very seldom necessary; even cases of long standing may, by proper management, be reduced by means of assistants, provided reduction be at all practicable. Inflammation after the operation should be obviated by the usual remedies. If the bone be apt to slip out again, which sometimes happens after repeated dislocations, the arm should be supported in a sling till the parts have recovered their tone. Blisters, frictions, stimulating medicines applied to the shoulder, and cold water poured on it, have sometimes been useful in restoring the strength of the joint.

Luxation at *the elbow* most commonly happens upwards and backwards; and then the fore-arm is shortened, the end of the ulna projects behind, and is higher than usual, while the extremity of the humerus can be felt in the bend of the elbow. The surgeon should take hold of the wrist with one hand, and the upper part of the fore-arm (which must be moderately bent) with the other, and gradually pull the top of the fore-arm downwards, while at the same time he increases the curvature of the elbow to disengage the ends of the bones from each other. He should then pull the bones forward into their situation. When the luxation happens upwards and forwards, it should be reduced while the arm is extended. After the reduction, the muscles of the fore-arm should be kept relaxed, by bending the elbow a little, till the parts have recovered their tone. When the bones of the fore-arm are dislocated from each other, which happens most frequently at the wrist, the rotatory motion of the hand is destroyed. After the reduction, the bones should be bound together by a tight flannel roller, or a couple of splints should be applied along the fore-arm, and the arm supported in a sling.

The bones of *the wrist* are not so often luxated as might be expected from the smallness of their size. When they are, great swelling and pain ensue, and the motion of the joint is entirely de-

stroyed. Great attention is necessary, lest luxation should be mistaken for a sprain. The arm and hand should be supported by assistants, but not stretched; and then the bones should be pushed into their place, and afterwards retained by proper bandages and splints. The bones of the metacarpus, when they happen to be dislocated, which is very seldom, are to be reduced in the same manner. Dislocations of the thumb or fingers are easily discovered. To reduce them, an assistant should hold the phalanx from which the dislocation happened, while the surgeon endeavours to elevate the bone from the one contiguous to it, and to pass it into its place.

The recital of various cases of luxation of the superior extremity would be endless, and of little avail to the reader, we shall therefore merely introduce the following case of dislocated shoulder, which is such a one as very seldom happens. It is given in the Medical and Physical Journal, by Mr. Evans, of Ketley, in the following terms:

"January 9, 1801, Wm. Whittingham, a labouring man, 64 years of age, applied to me with his left shoulder apparently much bruised, in consequence of a fall he had met with a few days before. The man was in liquor when the accident happened, so that he could give me no satisfactory account in what position his arm was in at the time he received the injury. On examination, I found the whole shoulder so much swelled, that I could not feel either the head of the os humeri or the extremity of the scapula; and, as the arm could be brought close to the side without difficulty or pain, I of course concluded there was no dislocation; therefore directed the shoulder to be well rubbed twice a-day with a volatile embrocation, and a stale beer poultice to be applied till the tumefaction subsided.

"In nine days after (about a fortnight from the time of the accident) he came to me again, with his arm and hand much swelled, but the shoulder greatly reduced in size, complaining of considerable pain in that part of the arm where the deltoid muscle is inserted into the os humeri.

"I had now a fair opportunity of examining the true state of the shoulder, which, to my great surprise, I discovered to be completely dislocated backwards; the head of the os humeri lying evidently upon the scapula. In the afternoon of the day he applied to me, I, with proper assistance, attempted the reduction by making a gradual extension with the fore-arm bent (the method I have adopted with success for many years, when the head of the bone lay in the axilla, or under the pectoral muscle); notwithstanding repeated trials, I gained no advantage. Thus foiled in my efforts, and the patient being a good deal fatigued, I postponed any further attempts until the following morning. In the interim, I recollected Mr White's method of reducing dislocated shoulders of seve-

ral months' standing, which determined me to adopt the same mode of practice, especially as my patient's case correspond much with that of James Dawson's, mentioned in page 100 of Mr. White's *Cases in Surgery*, excepting that the head of the os humeri was forced *upon* the scapula, and not *under* it, as related by Mr. White.

"The man being placed in a sitting posture on the floor, was kept firmly in that situation by an assistant. Two strong persons stood upon a table, and endeavoured to raise the patient by his dislocated arm, while I attempted to guide the head of the bone into the socket, but all our exertions proved ineffectual; which I attributed, in some degree, to want of sufficient power, and also to the opposition the biceps muscle (being on the stretch) might probably give us. I therefore procured a set of brass pulleys, usually employed for raising of timber and other heavy materials, and fastened them to a strong hook which was fixed in a beam at the top of the room. I then defended the man's arm above the elbow with a thick cotton handkerchief wrapped several times around it, over which was applied a strong towel, secured firmly to a cord that passed over the pulleys. One of the assistants made a gradual and powerful extension by pulling at the cord, the other kept the fore-arm bent, with the elbow in an oblique direction backwards, while I, at the same time, with one hand pressed down the scapula, and with the other, endeavoured to dislodge the head of the bone. In the space of a few seconds I had the satisfaction of feeling it give way, and hearing it crack as it went into its place. Upon which the patient with great ecstasy cried out, "It is in." He was then set at liberty; and, on examination, I found he was perfectly right in his assertion. He became immediately easier, and by carrying his arm in a sling for a few days, the swelling gradually subsided. At the end of a fortnight he was able to return to his usual employ."

SECT. V. LUXATIONS of the BONES of the INFERIOR EXTREMITIES.

From the great strength of *the hip joint*, it was formerly believed that the head of the thigh bone was never luxated by external violence: but it is now known that it happens by no means unfrequently. The ball in starting from its socket generally passes forwards and downwards into the foramen thyroideum. When this happens, the limb is considerably lengthened, the head of the bone is lodged near the under and fore part of the pelvis, the large trochanter is observed on the fore part of the thigh, a vacancy is perceived where the head of the bone and the trochanter should be, and the toes are turned outwards. When the bone is dislocated upwards and backwards, the limb is shortened, the great trochanter higher than usual, the knee and foot turned inwards.

When it is dislocated upwards and forwards, the leg is shortened, the ball of the bone is felt on the os pubis in the groin, and the great trochanter on the upper and lower part of the thigh; a vacancy is discovered on the corresponding part of the hip; the knee and toes are turned outwards. When the ball slips downwards and backwards, the leg is lengthened, the toes turned inwards, and the great trochanter is lower than that of the other limb. If the ball slip directly downwards, the leg is lengthened, but the knee and toes keep nearly their natural situation. It is sometimes difficult to distinguish between luxation and fracture of the neck of the bone. In fractures, the bone is most frequently pushed upwards, and the leg shortened, the knee and point of the toes are turned inwards, and may be moved much more readily outwards and inwards than when the bone is dislocated.

For *reduction*, the patient should be laid on a mattress, on the sound side, and a woollen roller covered with several folds of flannel placed between his thighs, and fixed firmly by straps to the wall. A strong bandage of buff leather, or something similar, should be applied to the under end of the thigh, with straps fixed to it to make the extension. The trunk of the body should be properly secured, and the joint of the knee bent. The extension should be made at first gently, and increased gradually, while, at the same time, the thigh is made to roll in different directions. When the extension is sufficient, two assistants should lay hold of the roller, and attempt to raise the bone; the extending force should then be slackened, and the surgeon should push the head of the bone upwards and outwards, while an assistant presses the knee forcibly inwards. The muscles themselves will then commonly bring the bone into its place; and this is done with such a jerk and noise, that it is heard by the bystanders. If the reduction be not obtained, the extension must be repeated with greater force. Instead of the roller, a broad strap or table cloth is frequently used. The limb should not be used for some time after reduction, and inflammation should be prevented by the proper remedies.

The *patella* can neither be luxated upwards nor downwards, without rupture of the tendons of the extensor muscles, or of the strong ligament which fixes it to the tibia; but it may be luxated to either side. The luxation produces lameness, and much pain on attempting to move the joint. In recent cases the injury is easily discovered; but when the surgeon is not called immediately, the swelling may be so great as to render it more difficult. For reduction, the limb should be kept extended; the surgeon, by depressing the edge of the patella most distant from the joint, is enabled to raise the other, and push the bone into its place.

It may be necessary to remain a day or two in bed till the knee recover its tone. Sometimes, after the bone has been displaced,

returns of the same complaint become frequent. In such cases, proper machinery applied to the side of the knee, where the bone is apt to start out, is used with advantage.

From the size of the joint, and the great strength of the ligaments, luxations of the tibia from the os femoris rarely occur. When it does, it is easily discovered by the pain, lameness, and deformity of the limb. The patient should be laid on a table, the muscles relaxed, and the thigh secured by assistants; the limb should then be extended, and the bones cleared of each other, when they will be easily replaced. After the reduction, the limb should remain for some time perfectly at rest; and inflammation, which is very apt to ensue, and is attended with very bad consequences, should be assiduously guarded against.

If the *ankle-joint* be dislocated forwards, the fore part of the foot is lengthened; if backwards, the foot is shortened and the heel lengthened (this is the most common variety); if to either side, there is an uncommon vacancy on the one side, and a prominency on the other. Dislocation, however, can hardly take place outwardly without fracture of the end of the fibula.

For reduction, the limb should be firmly held by assistants, the muscles relaxed, and extension made till the bones are cleared of each other, when the astragalus will easily slip into its place.—The same rules should be observed in reducing dislocations of the bones of the foot. Luxations of the metatarsal bones and toes are reduced exactly in the same manner as the bones of the metacarpus and fingers.

CHAP. XXXIV. OF FRACTURES.

SECT. I. Of FRACTURES *in general.*

THE term *fracture* is generally confined to such divisions in bones as are produced by external injury. When the integuments remain sound, the fracture is called *simple*; when it communicates with a wound, it is called *compound*.

Symptoms.] The general symptoms of fracture are pain, swelling, and tension in the contiguous parts. A grating noise when the part is handled, distortion, and a certain degree of loss of power in the injured part, accompany almost every fracture, except when it runs longitudinally, and the divided parts are not completely separated from each other. When there is only a single bone in a limb, a fracture is easily detected; but where only one or two bones of a limb has suffered, it is often difficult to judge with certainty, especially if the contiguous soft parts be tense and painful before the practitioner is called. In that case, the opinion must be regulated, not only by the attendant symptoms, but, 1st. By the

age and habit of the patient; for bones are more easily fractured in old than in young persons. Different diseases, too, induce brittleness of the bones, as the lues venerea and sea-scurvy. 2d. By the situation of the part; for bones are more apt to be fractured in the solid parts of their bodies than towards their extremities, where they are more soft and pliant. 3d. By the posture of the limb; for a weight may fracture a bone lying on an unequal surface, which it would have sustained without injury if equally supported. Fractures are sometimes attended with a great degree of ecchymosis, occasioned by the ends of the fractured bones wounding some of the contiguous blood-vessels.

Prognosis.] In giving a prognosis of fracture, various circumstances are to be attended to. It is evident that small fractured bones are more easily healed than large ones, and that the fracture of the middle of a bone is not near so dangerous as near the extremity. A cure is effected much more readily in youth than in old age, and in good constitutions than in bad. We ought also to attend to the concomitant symptoms, and the injury which the neighbouring parts may have sustained. The more moderate the symptoms, the more favourable our prognosis may be.

Treatment.] The treatment of fracture consists of three particulars; replacement, retention, and obviating bad symptoms.

1. When bones are fractured directly across the parts, they are often very little moved from their natural situation; but when the fracture is oblique, they are apt to pass over each other, and to produce much uneasiness and deformity; the contiguous muscles are severely injured, and the pain is aggravated by the slightest motion. The surgeon should put the limb into the best posture for relaxing all the muscles connected with it, according to the practice first introduced by Mr. Pott. If it be properly attended to, the ends of the bones will in general be easily replaced. When any difficulty occurs, a small degree of extension may be made, taking care to keep the muscles as relaxed as possible. Much attention should be paid to replacing the bones properly, otherwise the limb will remain for ever after distorted.

2. After the bones are replaced, the limb should be laid in the easiest posture, and the bones afterwards retained in their situation by proper compresses and bandages, not applied too tightly, till the cure be completed. The time necessary for this purpose depends on the size of the bone, the age and habit of the patient, the steadiness with which the limb has been retained in its place, and the violence of the attending symptoms. In middle-aged persons, and under favourable circumstances, a fracture of the thigh bone, or of the bones of the leg, may be cured in two months; of the arm bone, or bones of the fore-arm, in six weeks; of the ribs, clavicles, and bones of the hand, in three weeks. In infancy the cure will take a shorter, and in old age a longer, time than this.

3. In simple fractures, the inflammatory symptoms generally subside in a few days. When they become worse, which is sometimes the case, astringent applications should be employed. If these fail, blood ought to be drawn from the parts affected. This is of so much advantage, that it ought never to be omitted where the surrounding soft parts are much injured. Friction with emollient oils, warm bathing, the use of Bath and other similar waters, are also of much service. The limb sometimes puts on a clumsy appearance from an overgrowth of callus. When this tendency appears, ardent spirits and other astringents are considered as useful; sometimes pressure on the part by a thin plate of lead fixed by a bandage may be advantageous. Many instances occur, however, where no remedies prove successful: the patient ought therefore to be acquainted beforehand with the probable event, to prevent unpleasant reflections afterwards.

Sometimes the ends of the bone remain loose long after they might have been re-united. This may be owing to some constitutional disease, to the bones not being kept steadily in contact, to some of the soft parts getting in between them, or to the bone being broken in different places, and the intermediate fractures being too small to adhere. Pregnancy has also been mentioned as a cause. By removing these obstructions, a perfect union may in recent cases be accomplished. But where the case is of long standing, the callus of bones becomes so hard and smooth as to move with the ease of a joint, so that no advantage can be derived from laying them together. In that case, an incision should be made through the soft parts, and a small portion of the ends of the bone removed with a saw. If this be properly performed, nature will supply the deficiency. When small pieces of bone remain long loose, they should be extracted by making an opening. The intervention of muscles or other soft parts is known by the very severe pain and tension, and by particular motions of the limb causing great pain and twitching of the muscles which move it. The limb should be put into all the variety of situations; and if this does not succeed, an opening must be made, and the soft parts removed. Sometimes in fractures, blood-vessels are ruptured by the sharp spiculæ of the bone: this happens most commonly in compound fractures. When the effusion of blood is great, the part swells so much that it is necessary to lay it open, and to secure the divided vessels by a ligature. When the swelling is not great, the absorption of the blood is trusted to nature. When the blood remains long in contact with the fractured bone, it sometimes prevents the formation of callus; the periosteum separates from a considerable portion of the bone, and a thin fetid sanies is discharged at the wound. When this happens, no cure can be expected till the parts of the bone deprived of periosteum have exfoliated, or have been separated by a saw.

Mr. Carlisle, surgeon to the Westminster hospital, has published the following observations, on simple fractures where the union fails, in the Medical and Physical Journal:

“ One of the unpleasant accidents which occasionally happen in the treatment of simple fractures of the cylindrical bones,” says he, “ is the *failure of union*. It may possibly have occurred to some of your readers to note particular circumstances either in the general constitution, the mode of treatment in such cases, or peculiarities in the manner of the fracture. As I have not met with any satisfactory reasons for the defect of officic union in those occasional instances, I beg leave to state the following histories, which may perhaps induce gentlemen of greater experience, and better knowledge, to clear up this obscurity. The following three cases were the subjects of memorandums at the time they presented themselves, and which record is as follows.

“ A sailor, about forty-five years of age, on board one of his majesty’s ships of the line on the Jamaica station, had his thigh fractured by a fall, and soon afterwards returned home with a fleet. After fifteen months the broken thigh had not acquired any firmness, but it was easily moved, as-if a joint was formed at the fracture. The ends of the broken bone had passed each other two inches. The man was athletic, of dark complexion, chewed much tobacco, and drank spirituous liquors whenever he could obtain them. By his own account, the treatment of his limb, both as to bandages and rest, had been according to the common routine. This man was induced to undergo a painful operation; both ends of the fractured femur were sawed off to the extent of an inch and a half from each, and although the limb was carefully attended to, yet the union did not obtain, and he remained to the time of his death with a flexible joint in the middle of his thigh.

“ A young athletic man, between twenty and thirty years of age, by trade a house carpenter, had a simple fracture of the os brachii about its middle; the bandages and splints in common use were applied, and it was concluded as a matter of course that his limb would become firm in the ordinary time. At the end of six months I observed him still using the sling, and carrying his forearm and hand like a dead limb. On removing the bandages the fracture had not united, and motion of the limb did not occasion pain in the part. This man was a patient in the Westminster hospital, and had been enjoined low diet and extensive evacuations, which over-anxiety on his part had carried to great extent. His limb had always hung low in the sling, the fore-arm and hand were constantly cedematous, and the upper arm had stretched full two inches in length, so that the ends of the fracture were separated to this distance. I saw him twelve months afterwards with a disunited brachium, having tried a variety of methods to excite union, but all unsuccessfully.

" A foldier, between thirty and forty years old, had his tibia broken and fibula diflocated; he had been treated in a military hospital, and the lowering plan carried to its full extent. After ten months the broken bone was loofe, although a piece of fplinter appeared to be intervening; it is very probable that this man's limb became firmer, but I have never heard of his fate.

" Although cafes of defective offification after fimple fractures are uncommon, yet when they do happen it is very diftreffing to both the patient and practitioner. Nor is there any decided inference to be drawn from thefe cafes, as to the certain caufe of fuch misfortunes.

" The failor's thigh did not fail, becaufe the broken ends were pushed beyond each other; for this commonly happens to the fame extent, and yet the fracture unites; and the refult of his operation fhewed fomething like a conftitutional deficiency in the offific procefs.

" The carpenter's arm muft have been in a favourable pofition for union during the earlier period, for it was kept remarkably fraight.

" The foldier had experienced no other treatment or fymptom beyond what may be confidered as common routine.

" In all thefe men the vafcular fyftem appeared fluggifh, their pulfes were flow, and the characteristics of inflammatory difpofition were wanting. Perhaps, in fuch conftitutions where the offific union has once failed, or where the fluggifh, inactive difpofition of the vafcular fyftem is well marked, it may be prudent to watch the natural progrefs of inflammatory fymptoms; to moderate them when actually prefent, *rather than to anticipate their appearance*; and after the thirtieth day, to commence a more generous regimen."

SECT. II. FRACTURES of the BONES of the FACE.

Fractures of *the nofe* may impede refpiration, affect the fpeech and fenfe of fmelling, give rife to polypi and tedious ulcers, and may befides be dangerous from their vicinity to the brain. When any part of the bones of the nofe has been raifed above the reft, it is to be preffed into its place with the fingers; if it has been pushed into the noftril, it is to be raifed with the end of a fpatula or other fimilar inftrument. If any portion be almoft entirely feparated from the reft, it fhould be removed; but if it adheres with confiderable firmnefs, it is to be replaced. If the bones, after being replaced, do not remain in their proper fituation, they are to be retained either by tubes introduced into the noftrils, or by a double-headed roller, with proper compreffes as the cafe may require. Inflammation fhould be prevented by the proper remedies.

Much care is necessary in replacing the fractured bones of the face, and in dressing them, in order to prevent deformity. The dressings may be retained by adhesive plasters. Inflammation, by which the eyes, nose, or antrum maxillare, is apt to be injured, should be prevented. When matter collects in the antrum, it is to be removed by the methods formerly described.

For replacing fractures of the *lower jaw*, the patient should be seated in a proper light, with his head firmly secured. The surgeon should press with one hand on the inside of the bone, while with the other he guards against inequalities on the outside. If a tooth come in the way, it should be extracted; when any of the others are forced out of their sockets, they should be replaced, and tied to the neighbouring teeth till they become firm. The fractured parts being kept firm by an assistant, a thick compress of linen or cotton should be laid over the chin, and made to extend from ear to ear over it; a four-headed roller should be applied firm enough to keep the fractured parts in contact. The patient should be kept quiet during the cure, and fed upon spoon-meat. The dressings should be removed as seldom as possible. When the fracture is accompanied with an external wound, the parts should be supported by an assistant during the dressing of it.

SECT. III. FRACTURES *of the* CLAVICLE, RIBS, STERNUM, *and* SPINE.

A fracture of *the clavicle* is easily discovered by the grating noise in the fractured bone upon moving the arm freely, by the ends of the bone yielding to pressure, and by the motion of the humerus being impeded. All that can be done is to raise the arm, and support it at a proper height, either by a sling, or, which is better, by the leather case recommended in case of luxation of this bone. By this the fractured parts will be brought together, so far at least as to prevent deformity, and render the bone sufficiently strong.

Fractures of *the ribs* are discovered by pressure with the fingers. The symptoms are commonly moderate, and the patient soon gets well. In some cases, however, the pain is severe, the breathing becomes difficult, attended with cough, and perhaps with spitting of blood, and the pulse is quick, full, and sometimes oppressed. These symptoms arise from the ribs being beat in on the lungs.

In the treatment, it is proper in every case to discharge some blood. If one end of the rib rise, it ought to be repressed by moderate pressure; and to prevent its rising again, a broad leather belt should be applied pretty tight, and continued for some weeks. When a portion of the rib is forced inwards, an opening should be made over it with a scalpel, and then it should be elevated with

the fingers or a forceps. When distressing symptoms proceed from air or blood collected in the cavity of the chest, these fluids ought to be discharged by an operation.

The symptoms of a fractured *sternum* are nearly the same with those of the ribs. It requires great attention, from the vicinity of the heart and large blood-vessels. The patient ought to lose a quantity of blood, and be kept on an antiphlogistic regimen. If the pain, cough, and oppressed breathing, do not yield to these remedies, an incision should be made on the injured part, and the depressed piece raised with a levator. Should this be insufficient, it may be effected by means of the trepan: this, indeed, requires the greatest caution; but it may certainly be attended with advantage when the patient's life is in danger.

Fractures of the *vertebræ* generally end fatally. We judge of the existence of fracture there by examining the parts, by the severity of the pain, and by palsy occurring in the parts situated below the injured part.

When any parts of the *vertebræ* near the integuments are loose, they may be replaced with the fingers, and retained by proper bandages. When this is impossible, some of the latest authors think it advisable to make an incision, and raise any portions of the bone which may be depressed.

SECT. IV. FRACTURES of the BONES of the SUPERIOR EXTREMITIES.

The *scapula* is seldom fractured; when it is, the fracture is easily discovered by the pain, the immobility of the arm, and by the touch. The parts may be replaced with greater ease if the muscles connected with them be relaxed. They are retained with difficulty. A long roller should be employed for this purpose, with which the head and shoulders are also to be supported. The arm should also be suspended, to relax the muscles as much as possible, and inflammation particularly guarded against by local bleeding.

Fractures of the *humerus* are easily discovered by the pain, the immobility of the arm, and a grating noise on handling the parts. In reducing the fracture, the muscles should be completely relaxed, by bending the arm and raising it to a horizontal posture. Extension, if necessary, may be made by one assistant grasping the arm between the fracture and the shoulder, and another between the fracture and the elbow. After the reduction, one splint covered with flannel should be laid along the whole outside, and another along the whole inside of the arm; and then a flannel roller applied sufficiently tight to support the parts without interrupting the circulation. The arm may either be supported in a sling, or Mr. Park's leather case (fig. 84). The bandages should

not be removed for several days, unless some urgent symptoms render it necessary. In about a week, however, the arm should be examined to see whether the bones have been properly reduced.

When both of the bones of *the fore-arm* are broken, the fracture is easily discovered; but when only one bone is fractured, especially if it be the radius, the firmness of the other renders the discovery more difficult: the grating noise, however, on moving the bone in different directions, will generally be a sufficient symptom that a fracture has taken place. When the fracture happens near the wrist, particular attention is necessary in order to prevent a stiff joint. In order to replace the parts, the muscles are to be relaxed by bending the joints of the elbow and wrist, and the limb extended a little above and below the fracture. After reduction, a splint, reaching from the elbow to the ends of the fingers, is to be applied along the radius, and another along the ulna; and both are to be secured with a roller, or twelve-tailed bandage. When the splints are applied, the palms should be turned towards the breast as the most convenient posture. The arm should be hung in a sling. A partial dislocation of the bones of the wrist sometimes attends a fracture of the radius, by which a stiff joint, under the best practice, is apt to ensue, or permanent painful swellings of the fore-arm. In such cases, the patient ought to be warned of the danger, that no blame may be afterwards incurred.

When *the olecranon* is fractured, the arm must be kept in an extended state during the cure, by applying a splint opposite to the joint of the elbow, reaching from the middle of the humerus to the points of the fingers. The arm should be hung by the patient's side, to which it should be fixed by means of straps. To prevent the consequences of a stiff joint, the dressings should be removed about the eighth or tenth day, the fore-arm for some time slowly moved backwards and forwards, and the joint rubbed with an emollient oil. By a repetition of this at proper intervals, a stiff joint may be prevented.

Anchylolosis, or stiffness of the joint, commonly succeeds fractures of the bones of *the wrist*, owing to the great inflammation which ensues, and to their not readily re-uniting from their smallness. To prevent this as much as possible, after replacing the bones, the injured parts should be leached freely, and in proportion to the violence of the symptoms. Splints should be applied exactly as in fractures of the fore-arm, and the arm supported by a sling.

In fractures of *the metacarpal bones*, a firm splint should be applied over the whole palm and inside of the arm, from the points of the fingers to the elbow, in order to prevent the action of the flexors of the fingers. The best splint for a fractured finger is a piece of firm pasteboard properly fitted and softened in water till it can be readily moulded into the form of the part. This should be applied along the whole length of the finger, and secured with

a narrow roller. At the same time, a large roller should be applied over the inside of the hand to prevent the parts from being moved. To prevent stiffness, the dressings should be removed about the end of the second week, and the joint cautiously bent; and this should be repeated daily till the cure be completed.

SECT. V. FRACTURES of the BONES of the INFERIOR EXTREMITIES.

Fractures of the body of the *thigh-bone* are readily discovered by the grating noise when the ends of the bones are forcibly rubbed together, by the shortness of the limb if the fracture be oblique, and by the limb being unable to sustain the body. But fractures of the neck of the bone are often not easily distinguished from dislocation of the joint. In general they may be distinguished by the circumstances mentioned in treating of luxations of this bone. In forming a prognosis, we ought to consider that no fractures are more apt to disappoint our expectations than those of the thigh, especially when the neck of the bone is broken, owing to the difficulty of discovering the place of the fracture, and of retaining the bones even after they have been replaced. In order to reduce fractures of the thigh, the muscles are to be relaxed by moderately bending the joints of the thigh and knee: when this is done, unless there be much pain and tension, the bones are easily replaced by one assistant holding the upper part of the thigh, while another supports and gently pulls down its lower extremity, while the surgeon is employed in adjusting the fractured pieces. It is more difficult to reduce fractures of the neck of the bone, on account of the great strength and various directions of the surrounding muscles. In general, however, we shall succeed by moderate extension, if we take care previously to relax all the muscles as much as possible: if we do not succeed, we must have recourse to machinery.

The greatest difficulty is to retain the bones in their situation after they are replaced. The limb must be firmly secured by splints made of thin slips of wood glued to leather, or of thick pasteboard. One splint, broad enough to cover half of the thigh, should reach from the top of the hip joint to a little below the knee, and another, covering about a third part of the thigh, from the groin to a little below the knee. The splints should be lined with flannel. They are to be secured by a twelve-tailed bandage, and over all a thin pillow should be put nearly as long as the thigh. The splints and bandages may be put on in the following manner: the patient being placed on a firm hair mattress, with his knee moderately bent, the long splint bandage and pillow are to be applied to the outside of the thigh, and the patient should be turned somewhat towards the affected side, with the knee and leg raised a little higher than the body: the short

splint should then be applied along the inside of the thigh, and the bandage already placed without the other splint, applied so tight as to make an equal moderate pressure over the whole: (see Plate III. fig. 85.) To make the part still more secure, it is proper to insert a long firm splint of wood under the middle of the pillow, and to fix it by two broad straps to the upper part of the limb. To prevent the limb from being affected by involuntary startings, the pillow should be fixed to the bed by straps: to keep off the weight of the bed-clothes, a cradle with hoops should be placed over the thigh. The parts should be examined after some time to see that the bones be not displaced. When there is pain, swelling, and inflammation, leeches and other remedies should be applied. To render the situation of the patient as easy as possible during the cure, he may be allowed after the second week to turn a little more towards his back, and at the same time to extend the joint of the knee in a small degree: after this time a little flexion and extension of the limb may be daily repeated to preserve the use of the joint.

The method here described generally succeeds. Sometimes, however, notwithstanding all our care, the ends of the bone slip over each other. To prevent the deformity which this occasions, it has been attempted to make extension and counter-extension by machines: but the pain and irritation have always been so great that little advantage has yet been derived from such means. The invention (fig. 86) of the late Mr. Gooch, of Norwich, improved by the late Dr. Aitken, of Edinburgh, has been recommended as one of the best machines for oblique fractures of the thigh. After endeavouring to remove the pain, swelling, and inflammation, which are sometimes so great as to preclude the application of the simplest bandage, this machine may be tried. But if it be found impracticable to use it, the cure must be conducted in the usual way, with the chance of the fractured pieces overlapping one another, and of course the limb being somewhat shortened.

The *patella* is most frequently fractured transversely, sometimes lengthwise, and sometimes into several pieces. Fractures of this bone have been said commonly to end in a stiff joint; but this is perhaps most frequently owing to the limb being kept too long in an extended posture. In the treatment of fractures of this bone, the leg should be extended, to relax as much as possible the soft parts connected with the bone. The patient should be placed on a firm mattress, and a splint be placed under the limb long enough to reach from the top of the thigh to the under part of the leg, to which the limb should be fixed by a number of straps to keep it in a state of extension. The fractured bones are then to be brought together, and such a number of leeches applied to the joint as will remove as much blood as the patient can bear; and as long as much pain and tension continue, saturnine and other astringents

are to be used for removing them. When this is accomplished, and the parts properly adjusted, a large pledget of Goulard's cerate should be laid over the joint, and a hooped frame employed to keep off the bed-clothes. In a longitudinal fracture, the parts are easily kept together by a common uniting bandage or adhesive plaster: but in transverse fractures more force is necessary. Various bandages have been employed for drawing the pieces together in such fractures; one of the best of these is that represented fig. 87. We need not be anxious, however, about bringing the pieces very close together, as a cure may be made though they remain at a considerable distance. The bandages, unless particular symptoms occur, should not be removed till the end of the second week; after which the joint should be cautiously bent, every second day, to prevent stiffness.

The *leg* is commonly fractured near the lower end, this being the weakest part of the bones. In the treatment of a fractured leg the same rules apply which were given for a fractured thigh-bone. The muscles should be relaxed by bending the knee; but little advantage can be derived from bending the foot, for in proportion as the muscles behind are relaxed, those before are put on stretch: the patient may be therefore allowed to keep the foot in the easiest posture. The bones are commonly replaced by the gentle extension of the upper part of the limb by an assistant, while another supports it at the ankle. The bones being replaced, and the limb laid on its outside with the knee bent, two splints (fig. 88) are to be applied, long enough to reach from the upper part of the knee to the edge of the sole, so as to prevent the motion both of the knee and ankle. The splints are to be retained by a twelve-tailed bandage, as in the case of fractured thigh-bone. See fig. 85.

If the patient be either very restless or troubled with spasmodic affections of the muscles of the leg, an additional splint, shaped to the form of the leg, should be applied along the outside of it, and fixed by a strap at the upper, and another at the under, part of the leg. When the patient cannot rest when lying on either side, he may be placed on his back, and the curved state of the knee still preserved by raising the leg a little above the level of the body on a frame made for the purpose. This variety of posture may likewise be used in fractures of the thigh. The patient may from the first be laid in this posture, or he may alternately change from the one to the other. No change of posture, however, should be allowed for the first ten or twelve days. When the fibula only is fractured, it is apt to be considered as a sprain of some of the muscles; but this ought to be particularly attended to, as the mistake may be followed by bad consequences. When both the bones of the leg are broken, the portion next the foot is commonly drawn towards the back part of the leg, so that a prominence is produced by the fractured part of the upper portion of

the bone; and this is improperly termed the rising end of the fractured bone. The appearance is entirely produced by the inferior portion falling back. Hence no advantage is derived from pressure being made on the upper end of the bone: the inferior portion should be raised so as to bring the parts into contact, and then by proper bandages they ought to be supported till they are perfectly united.

Fractures of the bones of *the foot and toes* are treated nearly in the same manner as fractures of the hand and fingers. Besides the splint which may be necessary for the particular part, a large one should be applied over the sole; nor should any motion be allowed for a considerable time either in the foot or ankle, otherwise the bones may be displaced, and a proper cure prevented.

SECT. VI. Of COMPOUND FRACTURES.

By compound fracture is now generally meant a fracture of a bone communicating with an external wound in the integuments. They are much more dangerous than simple fractures. The generality of authors have considered amputation as indispensable in cases of compound fracture; while a few, particularly Mr. Billguer, surgeon-general to the armies of the late king of Prussia, affirm that it is scarcely ever necessary. Both seem to have carried matters too far. Some of the latest and best surgeons have recommended never to amputate immediately in private practice, unless when the bones are so much shattered that they cannot reunite, or the texture of the soft parts is completely destroyed; because, even if amputation be at last necessary, the patient will have a greater chance of recovering than if it had been performed immediately after the accident: for the state of weakness to which he is generally reduced, renders the attendant symptoms less violent. On the other hand, it has been considered as no bad rule in the army or navy, where patients cannot be kept in a proper situation, and where sufficient attention cannot be given, to amputate immediately in cases of compound fractures of the large bones of the extremities. When amputation is not performed immediately, it is not, for several days at least, admissible. It may afterwards be rendered necessary by hemorrhages, which cannot be stopped but by means more dangerous than amputation itself; by extensive mortification; or by the ends of the fractured bones remaining long disunited, while a great discharge of matter endangers the patient's life.

In *treating compound fractures*, all extraneous bodies should be removed, as also all those small pieces of bone which will probably not unite with the rest. For this purpose the opening, if necessary, should be enlarged with a scalpel. The next step is to replace the

bones by relaxing the muscles as in simple fractures. Sometimes part of a bone projects so far through the integuments, that it cannot be replaced without either sawing off the end of it, or enlarging the wound. If the fractured bone be long, sharp, and projecting much, it is best to saw it off; for though it were reduced, it would not readily reunite, and it would be apt to excite much pain and inflammation. But if it be broad at the base, and of no great length, it ought certainly to be sawed, even though it cannot be reduced without enlarging the wound. For the most part, it is only the skin which it is necessary to cut; but even the muscles ought to be divided, though as much as possible in the direction of their fibres, when the bone cannot otherwise be replaced. After the reduction, a pledget of some emollient ointment is to be laid over the wound, and the limb placed on a firm splint, and still kept in a relaxed posture. In dressing the wound, the limb ought not to be moved: the many-tailed bandage, therefore, should be used rather than a roller. Various contrivances have been fallen upon to allow the limb to be at rest while the surgeon is dressing it. The fracture-box, invented by the late Mr. Rae, surgeon in Edinburgh, is one of the best. When the leg is laid on this, it may be dressed with tolerable facility without moving it. We are happy to have it in our power to announce to the gentlemen of the medical faculty, that another machine has lately been invented by Mr. Samuel James, surgeon in Huddesden, Herts, which will yet more effectually relax the muscles, and retain the bones in their natural situation, without pain to the patient, or the least inconvenience to the operator. See fig. 89, Plate III.

It is of the greatest importance to prevent inflammation, which is apt either to produce mortification, or to give rise to extensive abscesses. The dressings should be removed once or twice daily, according to the quantity of matter. The common application of warm poultices, on account of their inconvenience, may be deferred till they become necessary by the approach of inflammation, which they are to be considered as the surest means of preventing by exciting a discharge of matter. Whenever the inflammation subsides, and a free discharge of pus is produced, the poultices ought to be laid aside, lest they do harm by relaxing the parts too much, and exciting too copious a discharge. The fore ought then to be dressed with mild astringents, and the patient kept on a nourishing diet with tonic medicines. A free passage should be given to the matter, by putting the limb in a favourable posture, and by making a counter opening, if necessary, in the most depending part. But this may be frequently avoided by covering the fore with soft lint or sponge to absorb the matter. If the discharge become excessive, and cannot be lessened by the means above mentioned, it will be found to proceed from a portion of loose bone which has not been earlier noticed, by the removal of which

it may be stopt. If instead of producing matter, the inflammation terminate in gangrene, the danger is still greater, than under the most extensive abscesses. For the treatment of this, the reader is referred to vol. III. p. 219.

We shall conclude this section with the following account of a "successful mode of preventing gangrene in compound fractures," communicated by Mr. John Crowther, of Halifax, to the Medical and Physical Journal:

"It may be proper to premise this account of the manner of treating compound fractures (says Mr. Crowther, who speaks in behalf of himself and Messrs. W. and R. Crowther, practitioners in the West Riding of Yorkshire), by observing, that the method now recommended has been practised, with the greatest success, by our ancestors, in Eland, near Halifax, time immemorial, being handed down from father to son.

"When we are called to a patient who has suffered a compound fracture (of the leg for example), we first endeavour, as expeditiously as possible, to clear the wound of all extraneous bodies, and then put the limb by a gentle extension into a good position, the knee being kept at the same time moderately bent, to favour the relaxation of the muscles of the fractured limb. While this is performing, we order a large quantity of black basilicon ointment, made with tar instead of pitch, to be liquefied in an iron or earthen pan, and made hot, and then put into it, with all dispatch, a large pledget of tow, sufficient if possible to cover the whole wound, so as totally to exclude all external air. If one pledget be not sufficient to cover all the lacerated parts, then another must be applied. Our manner is generally to spread out the tow take hold of each end, dip the middle part into the hot ointment, then lift it out and apply it directly to the wounded part. The leg being raised and kept in a proper position, as said above, a roller about two inches broad is applied in such a manner as to give liberty to the future swelling of the limb. The roller, before its application, is always moistened in alegar or vinegar (we generally use the former), with a solution of sacch. satur. in it, in the proportion of about half an ounce to a pint of the liquid. We begin at the foot, and roll upwards as high as, or above, the knee, rather tight at the ankle, if the fracture be not there, but always gentle wherever the fracture is, taking care at the same time that the great toe is in a line with the patella, and the sole of the foot nearly square with the heel; the latter rule is intended to prevent a retraction of the heel, which would hinder the patient after the cure from stepping fairly and even upon the ground, when he at first attempts to walk. Upon this roller we apply pasteboards, cut broad at the top and narrow at the bottom, of the length of the leg, and three or four in number, as occasion may require. These are to be soaked well in warm water, and fastened close to the

limb by another roller (not applied very tight) of the same breadth as the former, and moistened in the like manner. The paste-board is moistened that it may, when dry, take the shape of the limb, and be more easily and expeditiously applied at the next dressing. Then come the splints, one of which is to be large, and always put underneath the leg, so as to reach down from the bend of the knee to below the heel, and to keep the inferior fractured parts from sinking, and thereby prevent a prominence of the superior parts of the bones. The splints are always lined with soft linen, tow, &c. to fill up all the cavities of the limb, and lie easy; and this lining is fastened to the splints, that they may always come off together, and thus expedite the dressing. And particular care is always taken that a large soft compress or pad be placed underneath the heel, lest it should heat and inflame, and become intolerably painful. And, lastly, we place the limb upon a pillow, and tie it up with three or four pieces of tape at equal distances, fastened with bow knots, to be the more easily loosened. If the patient be tolerably easy, we do not take off the dressings for one, two, or sometimes three days; but if otherwise, we inspect the wound the following day, to examine the cause, and remove it. The second dressing is made in the same manner as the first, with this difference, that the ointment is not applied quite so hot, nor the bandage so loose as before, unless inflammation, or other circumstances, should indicate the propriety of a contrary treatment. Upon the third dressing the ointment is applied still cooler, and so on; but always continued as a warm dressing, until there be a free and laudable purulent discharge; which being once accomplished, the ointment is used quite cool to the end of the cure, unless some contra-indication should arise, such as proud flesh, &c. The same moist bandages, and their manner of application, are generally continued until the inflammation of the limb abates, and then they are used in a dry state. In about a week or ten days we commonly begin to be more circumspect at every dressing in shaping the limb, by making greater extensions, bringing the fractured parts of the bones more into contact, closing the lips of the wound, &c. for, before this time, we are under no great apprehension of any little irregularity in the coaptation of the ends of the bones. Indeed, for some time after this period, we compare the callus to soft glue, which we can shape and mould nearly as we please; and for this reason we do not disturb the fracture too much by extensions, &c. at the first, while the parts are in an inflamed and irritable state. The perfect formation of the callus, and union of the bones of the fractured leg of the adult, of a middle age, we generally find to take place in about twenty-five days, provided there be no loss of bone. And what is remarkable, we have sometimes known, in simple fractures, the callus to stiffen and unite very suddenly; for instance, the limb has been

somewhat flexible at the fractured part the preceding day, and stiff the next.

"We always examine the pulse at every visit, and form a particular judgment by it; if it be full and strong, and not very quick, as from 70 to 90 in a minute, we augur well of the patient; but if it be quick and weak we esteem it a bad sign. In the beginning we prefer costiveness to an open body, and wish it to remain so for the first week or ten days, as we think that it keeps up the patient's strength, and produces a vigorous circulation in the vessels and lacerated parts, which it is our endeavour to promote; and has also this further advantage, that the limb is in no danger, in the early stage of the cure, of being disturbed and shaken by the preparation necessary for an alvine discharge. In compound fractures there is usually a great loss of blood; but if this should not be the case, and there come on much swelling and inflammation, with a full strong pulse (which in our practice rarely happens), we do not hesitate to bleed freely, and give saline cathartics, such as sal. Glauber. &c. and, if necessary, apply leeches to the tumefied parts, and fomentations, and cataplasms of oatmeal and grounds of beer boiled together, but always the ointment before mentioned upon the wounded parts. We recommend it to our patients to sit up in bed every day, conceiving it to be a great means of both promoting digestion and preserving the strength, and far preferable to their being confined in a supine posture for such a length of time. The patients are generally kept to their usual diet, but we forbid beer, wine, and all spirituous liquors for drink, unless they have been much accustomed to any of them, and then allow a moderate quantity. For common beverage we prefer tea, barley-water, and milk. But if the wounded person be of a cold phlegmatic constitution, and the pulse weak, we give Peruvian bark liberally; and allow a more generous diet and some wine, with the intention of strengthening the habit, and keeping up the circulation in the wounded and lacerated parts; for we fear nothing more than a pale and fallow complexion, a weak quick pulse, and defect of a glowing febrile warmth.

"As we live in a part of the country which abounds with coal mines and stone quarries, and is full of manufacturers, many of whom are employed in the direction of dangerous machines worked by steam-engines, we are frequently called upon to attend very serious accidents. From the 28th of April, 1798, to the 5th of October, 1800, not fewer than ninety-eight fractures have fallen to my share, twenty-eight of which were fractures complicated with a wound; but which were never followed by any gangrenous appearances."

Mr. Crowther says the same success has attended the practice of his two brothers for many years.

CHAP. XXXV. OF AMPUTATION.

SECT. I. *Of AMPUTATION in general.*

In amputation, which in surgery signifies cutting off a limb, the great end to be aimed at is, the procuring of a handsome stump, in which the bone may not protrude, but be well covered with flesh; so that no excoriation or rawness may be apt to take place. As long ago as the year 1579, it was proposed by Jacob Young, an English surgeon, in a treatise entitled *Currus Triumphalis ex Terebinthino*, to preserve a flap of flesh and skin, which was to be folded over the bone, and which, uniting to the parts of the wound after amputation, would effectually cover the bone, and prevent the inconveniences above mentioned. No traces of the success of this method, however, can be found till the year 1626; when a Latin dissertation was published upon it by P. Adrian Verduin, an eminent surgeon in Amsterdam. The most sanguine expectations were formed of its success; and it was even thought that the flap would prevent the necessity of tying up the blood-vessels. However, it does not appear that the method as at that time practised either did or could succeed; and accordingly it was entirely laid aside; but it has been since revived with considerable improvements by Mr. Alanfon of Liverpool.

Amputations may be rendered *necessary* when a member is so much diseased as to be useless, or when it puts life in danger.

The causes in general rendering this operation necessary are, bad compound fractures; extensive lacerated and contused wounds; part of the limb carried off by a cannon ball or otherwise, the bones being unequally broken and not properly covered; extensive mortification; white swellings of the joints; large exostoses; ulcers attended with extensive caries; cancer or other incurable ulcers; varicose kinds of tumors; particular distortions of the bones.

Amputations may also be sometimes necessary from violent hemorrhage of some principal artery during the cure of a fractured limb, or from such a profuse discharge of matter taking place that the strength of the patient is exhausted. Lacerated and contused wounds may require amputation, on account of hemorrhage ensuing which cannot be stopped. Extensive mortification may take place and such large quantities of matter be formed, that the patient will not be able to bear up under the discharge.

Where part of the limb is carried off, it is necessary to amputate higher up, so as to cut the bone, as well as the soft parts, in such a manner as may admit of a much speedier and safer cure. When mortification occurs, every thing ought to be done for the support of the patient till the disease be stopped; the first sign of which is, the appearance of an inflamed circle between the diseased and

found parts. As soon as the diseased begin to separate from the found parts, amputation of the limb ought to be performed, and no time ought now to be lost, lest the patient suffer from the absorption of putrescent matter.

No part of surgery is brought to greater perfection than the manner of performing amputation. Before the invention of the tourniquet, and the method of securing the vessels by ligature, the operation was seldom undertaken; and a great proportion of those upon whom it was performed died soon after. In the present improved method one death does not happen in twenty, or even thirty cases. In performing the operation, particular attention is to be paid to the spot where the incision is to be made; the quantity of skin and cellular substance necessary to be saved, so as to cover the muscles and bone completely, without being stretched; cutting the muscles in such a manner that they may unite with each other and entirely cover the end of the bone; the prevention of hemorrhages during the operation; the tying of the arteries alone, without including the nerves or any of the contiguous parts; securing the integuments so as to prevent them from retracting after the operation; and a proper subsequent treatment of the case.

The following are the *general steps of the operation*: The patient being properly placed, with assistants to attend, and the apparatus in proper order, the flow of the blood to the limb is to be stopped by the tourniquet (fig. 10.) The first incision is to be made through the skin and cellular substance by one, or rather by two, strokes of the amputating knife represented in Plate IV. fig. 95. These are next to be separated from the muscles, as far as may appear sufficient for covering the stump. The separated skin or flap should be strongly drawn up, or what perhaps answers better, turned up all round the limb, leaving this part of the muscles quite bare. The flap is to be kept in this situation by an assistant, while the operator makes the next incision at the edge of the reflected skin, and cuts till he comes to the bone. This incision should be begun on the lower side of the limb, that the blood may not prevent the eye from readily following the edge of the knife during the whole cut. The muscles are now to be separated from the bone as high as may enable them afterwards completely to cover it. The soft parts in general are then to be drawn up by retractors, which may be either of leather, as in fig 96, or metal, as in fig. 97. The periosteum is to be divided at the place where the saw is to be applied; but no part of the bone is to be denuded of this membrane, which is afterwards to cover the stump, otherwise troublesome exfoliations may ensue. At this place the saw (fig. 98) is to be applied, and the bone divided with long steady strokes. In this part of the operation a good deal depends upon the readiness of the assistant who holds the limb; for if it be held

too high the motion of the saw will be impeded; while the bone may be splintered if it be not sufficiently raised. Any points or splinters which may be left should be immediately removed with the pincers (fig. 99). The retractors are now to be laid aside, and the principal arteries separated from the nerves, and secured by the tenaculum (fig. 11), or forceps (fig. 103), and ligatures.

The tourniquet should next be a little slackened, to allow the different branches to be discovered; the clotted blood is to be cleared away with a warm sponge. The patient should have some warm cordial drink, and all the arterial branches which can be discovered ought to be taken up. The ends of the ligatures are then to be cut of such a length as to allow them to hang without the lips of the wound. The muscles and skin are now to be drawn down, and brought into close contact, that the stump may be completely covered. The parts are next to be secured by proper bandaging; and if the operation has been properly performed, the cure will commonly be made by the first intention, and may be completed in the course of three or four weeks, and sometimes in a shorter period. This however must depend much upon the constitution of the patient, as well as the manner of performing the operation.

SECT. II. *Of AMPUTATING the ARM and FORE-ARM.*

Amputation of the arm is performed according to the rules already laid down. No more of it should be removed than is diseased; for the longer the stump is, the more useful it proves. The tourniquet is to be applied a little above the part where the operation is to be performed: as much of the integuments should be saved as may be perfectly sufficient for covering the fore. In taking up the artery, after the bone has been divided, the operator ought to be attentive not to include the radial nerve, which may be readily discovered and separated, as it lies close upon the fore part of the artery. The fore-arm is to be amputated nearly in the same manner as the leg; only that the stump may be covered by amputating with the double incision, without the assistance of a flap, which it is necessary to form in the leg.

In the Medical and Physical Journal, there appears the following account of an uncommon occurrence after amputation of the arm, by Mr. Rowlands, of Chester:

“On September the 9th, 1794, Robert Jones, a collier, was drawn up with great velocity out of a pit, forty yards deep, by the fore arm, which was nearly separated from the elbow, by being drawn between the rope and the wheel. The accident happened early in the morning; and a surgeon in the neighbourhood applied a tourniquet about four inches below the shoulder. He was

brought to the infirmary about six in the evening, and his arm immediately amputated above the ligature, which had been tight on all day. The man bore a journey of ten miles in a cart, with his arm in that shattered condition, and sustained the operation without either fainting or complaining; he took an opiate, and had a better night than could have been expected.

"The next day a clyster was administered, and he took saline draughts, with fifteen drops of vin. ant. in each, to remove a slight degree of fever: he continued the opiate every night. On the 13th, I looked at the stump," says Mr. Rowlands, "and had the satisfaction to find it perfectly united in every part, but where the single ligature hung out, only one artery having appeared. On the 22d the ligature separated; and on the 25th, all dressings, except a little lint and the roller, were left off.

"The man had walked about the ward for many days, his appetite being good, and his nights undisturbed.—On the 27th, about three in the morning, I was desired to come to him immediately, the messenger at the same time informing me that he was bleeding to death.—I hastened to him, and found the poor man in a miserable condition. The tourniquet had been applied by Mr. Manning, the house apothecary; but as the hæmorrhage came on in the middle of the night, he had lost so much blood before a discovery was made, that the bed was wet through, and the blood flowed across the ward. After removing the bloody things from about the stump, I discovered the cause of this extraordinary accident, to be an extensive mortification of the artery and integuments covering it. The union of the stump continued complete; the skin having separated in a slough, about an inch from the edge of the cicatrix. I made a ligature on the artery, and dossils of lint were applied to the mouth of it. The wound was dressed with mild digestive; every means had been used, and were still continued, to recover him from the low, fainting state to which he was reduced; and a person was directed to watch him constantly, and to make a slight compression on the end of the vessel. 28th, No appearance of blood. 29th, In the night, a second sloughing of the artery took place, and the ligature came off. The tourniquet was tightened as expeditiously as possible; but so great was the loss of blood, that in his reduced state it had nearly destroyed him. As soon as he was a little recovered, I made an incision in the direction of the artery to the axilla, and put a ligature on the vessel, as high up as possible. The wound was dressed as before, and moderate pressure was continued by a careful assistant. Nothing further occurred worthy of observation; the wound healed slowly, but eventually so as to leave a very good stump; and he was discharged from the infirmary in good health on the 28th of November following."

SECT. III. *Of AMPUTATING the THIGH.*

In performing this amputation, the patient ought to be placed upon a table of ordinary height; with the diseased limb supported and secured by an assistant seated before him, while other assistants take care of the other leg and the arms. The course of the blood is to be stopped by applying the tourniquet over the trunk of the femoral artery, near the upper part of the thigh. No more of the thigh ought to be removed than is rendered necessary by the disease, as the more of it is left, the more useful it will be to the patient. An assistant should grasp the limbs with both hands a little above the place where the skin is to be divided, and draw it up as far as possible; while the operator, standing on the outside of the limb, makes a circular incision down to the muscles, by one or two strokes of the knife. As much of the integuments is then to be dissected with a scalpel from the muscles as may cover the stump completely; and this part of the skin may either be turned back, or drawn lightly up by an assistant. The muscles may then be divided quite across to the bone by the edge of the skin, in the common way, or cut obliquely upwards, according to the method of Allanson, so as to lay the bone bare two or three fingers breadth higher than is done in the common way. The muscles are next to be separated from the bone with a scalpel a little way, that a sufficient quantity may be left for covering the end of it. The rest of the operation is to be performed exactly according to the general rules laid down in the first section of this chapter. The muscles and integuments are to be drawn over the end of the bone, and applied closely together, that the skin may completely cover the stump, and retained in this situation by an assistant till a flannel or cotton roller, according to the season of the year, which has been previously put round the body, be applied in such a manner as to support and fix them. For this purpose it should be passed two or three times, in a circular direction, round the top of the thigh, and should afterwards, with spiral turns, be brought down near to the end of the stump, and fastened with pins; and it should not be tighter than may be sufficient to assist the plasters in preventing retraction.

The ends of the divided muscles are now to be laid exactly over the bone; and the edges of the skin are to be brought into contact, either so as to form a straight longitudinal line, according to the method of Mr. B. Bell, &c.; or they are to be placed horizontally, "that the wound may appear only in a line with the angles at each side," as advised by Allanson. The ligatures may either hang over the edges of the wound, or be brought to the angles. After the edges of the skin are in this manner exactly applied to each other, either a few slips of adhesive plaster are to be laid

across the face of the stump, or two large pieces of adhesive plaster, with several pieces of tape fixed to them, are to be applied to the surface of the skin. The tapes are then to be tied with a running knot immediately over the wound; by which the parts will be kept so closely together as to prevent any collection of matter from being formed. The whole surface of the stump should next be covered with a large pledget spread with an emollient ointment, over which a compress of fine tow is to be put, and retained in its place by a broad cross strap of old linen, passing some way up the thigh, so as to be secured by the roller, which is now to be passed two or three times round the stump; and the pressure formed by the cross strap may afterwards be increased or diminished at pleasure, by drawing it with more or less tightness, and fixing it with pins to the roller. While the stump is dressing, the tourniquet is removed, but replaced again loosely, to enable the attendants to check any hemorrhage which may afterwards ensue.

The patient is now to be laid to rest, and the limb is to be placed upon a little tow covered with linen, or upon a thin soft pillow; and to prevent the patient from involuntarily moving the limb, and to guard against spasmodic startings, which frequently happen after this operation, it may be fixed to the bed by two straps. A basket or hooped frame ought to be placed over the stump to protect it from the bed clothes. The patient should immediately have an anodyne draught, which will generally procure ease through the rest of the day. For this purpose, no more light should be let into the room than is merely necessary for allowing the attendants to pay attention to the stump. As hemorrhages sometimes occur several hours after the operation, the person who takes the charge of the patient should watch this circumstance with the greatest attention. If there be only a slight oozing of blood, there is no occasion for being alarmed; but whenever it appears to proceed from a large artery, it must be secured. The spasmodic affections which frequently occur after amputation are seldom troublesome, unless some nerve has been included in securing the arteries; but when they do appear, laying the limb in the easiest posture, and giving opiates, are the principal means of procuring relief.

To prevent inflammation as much as possible, the patient is to be kept upon a strict antiphlogistic regimen, and his bowels kept open by laxative clysters, till the inflammatory stage is over, which will generally be in a few days. If, notwithstanding this treatment, the stump swells, and the patient complain of pain and tightness, we ought to endeavour to discover from what cause the uneasiness originates. If it be owing to the straps being too tightly fixed, they must be slackened. If the stump be found much swelled, a cooling solution should be applied by means of several folds of linen; and, if the patient be young and plethoric, he ought to lose

a few ounces of blood from the arm; but if he be weak and emaciated, a different mode of treatment must be followed.

At the end of the third, or fourth day at farthest, the stump should be examined; and if it appear somewhat open and flaccid, the parts must be brought closer together and secured more firmly. After this time the dressing should be renewed every day, or every second day. In about a week after the operation the ligatures may generally be removed with ease; but if they do not separate readily, they may be gently pulled at every dressing, when they will, in a short time, be brought away, and the wound will be soon healed by the first intention. The roller should be cleaned and renewed as often as it is found sullied; nor should it be laid entirely aside till the end of the third or fourth week after the operation. When the roller is removed, we may depend upon the straps or tapes for keeping the parts together till the cure be quite accomplished. When the inflammatory symptoms are entirely gone, no medicines ought to be given which would debilitate the patient, nor is any thing more necessary than to keep the bowels gently open till a complete cure be made.

SECT. IV. *Of AMPUTATING the LEG.*

The leg may be amputated, for a disease in the foot, at two different parts; the one a hand-breadth under the knee, the other a little above the ankle. The former makes a sufficient support for the body to rest upon an artificial leg; but the latter does that equally well, and likewise preserves the motions of the knee.

In performing the operation a little way *under the knee*, the patient is to be placed and secured in the same manner as in operating upon the thigh. The tourniquet is to be placed a little above the knee, with the cushion upon the artery in the ham. The surgeon places himself upon the inside of the leg, and makes a circular incision through the integuments down to the muscles. The place where the incision should be made must depend upon the length of the limb; but, in general, it may be between six and seven inches under the top of the tibia in an adult, or far enough down upon the same limb to save as much integuments as will cover the stump. After the integuments are cut through, in the manner already directed, as much of the muscles are to be divided by the knife as can be done by a circular incision; and the interosseous parts are to be divided by a scalpel or catline (fig. 100). The retractors are then to be applied, and the bone sawed off immediately below the insertion of the tendons of the flexor muscles. In sawing, the operator ought to begin upon both bones at the same time, that he may finish upon the tibia, lest splinters should be formed. The vessels are next to be secured; the soft parts drawn

over the bones; the adhesive plasters and other bandages applied in the same manner as directed for amputating the thigh, only that here the roller need not be applied so high as in the former operation. Two or three turns above the knee, however, are necessary to prevent the dressings from slipping down.

In amputating upon *the ankle*, the operation is performed in the same manner as that a little below the knee; but the operator should fix upon that spot which will leave the stump of such a length as may be most convenient for being fitted with an artificial machine resembling the other leg. Nine inches from the joint of the knee, in a leg of ordinary length, was found by Mr. Wilson, a late ingenious artificial limb maker in Edinburgh, to be the best part suited to that purpose, on account of the equal pressure it makes upon the surface of the leg, without making any upon the end of the tender stump.

A patent has lately been obtained by Mr. Potts, for a contrivance, which supplies a useful leg in cases of amputation above the knee.

The patentee, whose attention was drawn to the subject by the loss of his own leg, has constructed an artificial one, which he himself has worn for years, and which is possessed of the following advantages: "The knee and ankle joints," he asserts, "are entirely at the command of the wearer; and the appearance of their motions is so natural, as very nearly to conceal the loss of the extremity: the leg is made of light materials, and indeed of such as imitate both the bony and fleshy parts. It is worn with ease and perfect safety; it does not injure the dress, which other artificial legs are observed to do. The wearer can kneel and rise up; can sit down and rise up; can pull on a boot, and permit it to be drawn off by a boot-jack; he can turn the anterior part of the foot outwards and inwards; ride on horse-back with perfect safety; and imitate almost every natural motion without any assistance of his hands."

SECT. V. Of AMPUTATING at the JOINTS of the EXTREMITIES.

The circumstances most to be attended to in performing amputation at the joints are, first, to stop the circulation by the tourniquet; or, where that is impracticable, to take up the trunk of the artery by a ligature; to make a circular incision in such a place as may, after the operation is over, be sufficient to cover the wound: then a longitudinal incision is to be made upon the opposite sides of the limb, extending from the joint to the circular cut, and as deep as the bone, by which two flaps will be formed to cover that part of the joint which remains after the operation is finished. The ligaments of the joint are next to be divided, and the affected limb or part of the limb removed.

After this part of the operation, it was formerly a frequent practice to scrape off the remaining cartilage, to unite the parts more firmly together. But this is now found to be unnecessary; for when the flesh is applied properly to the bone, if it do not grow to it, the union at least is so close that it afterwards gives no inconvenience to the patient.

Any branches of arteries which may have been cut during the operation are now to be secured; clotted blood is to be removed; and the muscles and the skin are to be brought into close contact with the ends of the ligatures hanging out of the wound. The parts are to be retained by adhesive plasters, or twisted future, or both; and proper bandages applied, in such a way, that a cure may be made by the first intention.

Amputating the arm at the *shoulder-joint* has always been considered as a dangerous, as well as a difficult operation. It should never be attempted, when the same purpose can be accomplished by operating lower down. But cases occasionally occur, where the life of the patient cannot, in any other manner, be saved.

Amputation may become necessary here in consequence of abscesses of the joint; caries of the humerus reaching to the joint; compound fractures, especially those from gun-shot wounds, extending to the head of the bone; and of mortification.

In performing the operation, the patient should be laid upon a table of convenient height, covered with a mattress. He is then to be brought as near to the edge of it as possible, and secured by assistants. The circulation of the blood in the arm is next to be stopped, by an assistant pressing strongly with a firm compress upon the subclavian artery where it passes over the first rib; or an incision may be made along the course of the artery, which may be secured after separating from it the contiguous nerves. When the artery is compressed, it will readily be known whether the compression proves effectual, by observing when the pulse at the wrist is entirely stopped. As soon as this is the case, a circular incision is to be made through the integuments, at the insertion of the deltoid muscle, into the humerus. An assistant then draws the skin a little back, and at the edge of the retracted skin the muscles are to be cut in a circular direction to the bone.

If the artery has not been taken up at the beginning of the operation, it is now to be secured, as well as any branches which come in the way.

The amputation-knife is now to be laid aside, and the rest of the operation finished with a strong scalpel. A perpendicular incision is next to be made at a little distance from the outside of the artery, beginning at the acromion, and terminating in the circular incision, cutting as deep as the surface of the bone. A similar incision is to be made on the back part of the arm, so that the flaps may be of an equal breadth. The arterial branches are here to be se-

cured; the flaps are to be separated from the bone, guarding against wounding the trunk of the artery; the flaps are to be supported by an assistant, and the capsular ligament of the joint is to be cut from the scapula: and thus the arm will be entirely separated.

After the arm has been separated, any arteries which appear about the joint are to be tied, and all the ligatures brought over the edges of the wound. The parts are to be cleared of clotted blood, and the two flaps drawn over the wound, and secured by adhesive plasters. A pledget of any emollient should then be applied, and a sufficient cushion of lint, with a compress of old linen, put over the whole. A moderate pressure is next to be applied by a flannel roller; by which the parts will be supported, their union facilitated, and matter most likely prevented from being lodged. The treatment is then the same with that after amputation in other parts of the extremities. For two or three days after the operation, it is necessary that an assistant sit with the patient to compress the artery in case a bleeding should ensue.

When it is necessary to amputate *the whole hand*, the operation may be performed at the wrist, so as to leave as much of the member as possible; and the same rules hold here as in amputating at any of the rest of the joints. The tourniquet is to be applied to the artery in the arm, and the cure is to be completed by the first intention. When any of the carpal bones are affected, the fore will not heal till they either work out by suppuration, or are cut out by the knife. When the middle of any of the metacarpal bones is diseased, while their extremities are sound, the trepan may be applied, and the diseased parts removed, while the remaining sound parts are preserved. But if the whole bodies of one or two of these bones be affected, while the rest remain sound, all the affected bones ought to be removed. In performing the operation, an incision is to be made along the course of the part affected; and if the operator have it in his choice, the incision should be made upon the back part, so as to save the great vessels and nerves situated in the palm. The integuments are then to be dissected, and turned to each side; after which the diseased bones or parts of bones are to be removed, guarding as much as possible against wounding the principal arteries or nerves which lie near them.

The diseased parts are next to be separated; any arteries which happen to be cut are to be secured; and, on account of the free communication which they have with neighbouring branches, they ought to be tied at both cut ends. If after this a bleeding still continue, compress, styptics, and other remedies proper for stopping blood, are immediately to be used. The sides of the wound are to be brought together, and an attempt made to cure them by the first intention.

In *amputating the fingers*, it was formerly the practice to operate

upon the bodies of the bones in the same manner as in the larger extremities ; but at present the removal at the joints is more frequently practised.

In performing the operation, it is necessary to save as much skin as may cover the stump, and this ought to be done upon the side next the palm, so as to guard against the effects of friction. The general steps of the operation are the same with those for amputation of the larger joints.

A circular incision is to be made on the finger by a crooked bistoury, about the middle of the phalanx, and it may be carried at once to the bone. Another incision is to be made with a common scalpel at each side of the finger, beginning at the circular one, and continuing it to the joint, by which two flaps will be left to cover the stump. The ligaments of the joint are now to be divided, and the bone removed. The blood-vessels are to be secured by ligature, and the flaps exactly applied to each other ; but in order to protect the end of the bone completely, a small portion may be cut from the uppermost flap. The flaps are to be retained by adhesive plaster, or by the twisted future ; but if the latter be used, the tendons ought to be avoided. Over the fore an emollient pledget is to be applied, and then a compress and roller. If the disease be so situated, that instead of amputating at the cavity of the joint, the surgeon shall think proper to operate upon the body of the bone, flaps are to be formed as above, and the bone is to be divided by means of a small spring saw.

The amputation of the thigh, at *the hip joint*, has always been considered as one of the most formidable operations in surgery ; so much so, that very few cases appear on record of its having ever been put in practice. In the Medical Commentaries of Edinburgh, an instance is recorded where the thigh was amputated at this joint, and where the patient survived the operation eighteen days, and then died from a different cause, when all risk of hemorrhage was over, and when the fore had even a favourable appearance ; which shews at least that the operation may be done with safety. It certainly ought never to be done, however, unless as the last resource, and when the life of the patient is in absolute danger ; and then only when as much skin and muscles can be saved as will cover the fore, and when there is also a probability of being able to stop the hemorrhage, and prevent it from returning.

When the operation is to be performed, the patient is to be laid upon his back on a table, and properly secured by assistants ; one of whom should be ready with a firm cushion to press, if necessary, upon the top of the femoral artery just after it passes from behind Poupart's ligament to the thigh. A longitudinal incision is now to be made through the skin, beginning immediately under the ligament, and continuing it downwards along the course of the ar-

tery for about six or seven inches. The aponeurosis of the thigh is then to be divided by gentle scratches till a furrowed probe can be introduced, when the opening is to be dilated by means of a scalpel, till two or three inches of the artery be laid bare. A strong ligature is now to be put under the artery by the assistance of a curved blunt-pointed needle.

The part where the ligature should be passed is immediately above the origin of the arteria profunda; for if that artery be not affected by the ligature, the patient might suffer by the loss of blood during the rest of the operation. The ligature is now to be secured by a running knot: another ligature is to be introduced a little below the former, and likewise secured; the artery is then to be divided between the ligatures. A circular incision is now to be made through the integuments of the thigh, about six inches from its upper end. The retracted skin is then to be pulled at least an inch upwards; and at the edges of it the amputating knife is to be applied, so as to cut the muscles down to the bone. This being done, a cut is to be made upon the posterior part of the thigh, beginning a little higher than the great trochanter; and continuing it down to the circular incision, and as deep as the joint. A similar cut is to be made on the anterior part of the thigh, at a small distance from the artery, and this reaching likewise down to the bone. The two muscular flaps are to be separated from the bone and joint, and held back by an assistant. Every artery which appears is now to be secured. Then the capsular ligament, and next the round one, are to be separated from the acetabulum; by which means the limb will be removed from the body. The acetabulum and neighbouring bone are next to be examined; and if they appear sound, the case will be more favourable; but, at any rate, a cure is to be attempted by the first intention. For which purpose, after removing all the clotted blood from the surface of the wound, and bringing the ligatures over the edges of the skin, the muscles are to be placed as nearly as possible in their natural situation; and drawing the flaps together, so as to cover the wound in the most accurate manner, they are to be kept in this situation by adhesive plaster, and by the twisted suture and other dressings, as in amputating at the under part of the thigh. The dressings are to be retained by a broad flannel roller passed three or four times round the body, and spirally over the stump, and secured. The patient is then to be laid in bed on the sound side, and treated as for amputation in other parts of the body; only that greater attention is necessary, as there is no assistance from a tourniquet. Uncommon attention will also be necessary to prevent inflammation, and every symptom of fever which may succeed to the operation.

When *the foot* is so much diseased as to require amputation, the operation might be performed at the point of the ankle; but for

the reasons given, when treating of amputation of the leg, it is found better to do it above the ankle. When a considerable part remains sound, it ought to be saved. If any of the tarsal bones are affected, these are to be removed. When the middle or whole body of any of the metatarsal bones are diseased, they are to be removed in the same manner as directed for similar operations in bones of the hand; and if even two of them remain sound, provided they be so placed as to support the toes, they ought to be preserved, as it is known that, by proper treatment, an offensive matter may afterwards fill a considerable part, if not the whole, of the void; or, if any cavity remain, it may be so filled that the use of the foot may still be enjoyed.

In performing an operation of this kind, the patient should be laid upon a table, and the tourniquet applied to the ham to prevent hemorrhage. An incision is then to be made along the affected part; and if the seat of the disease admit it, the incision should be made upon the upper side of the foot, so as to save the sole. The integuments are to be separated and turned to each side, to allow the affected parts to be completely removed.

The principal vessels and nerves are to be saved as much as possible; but if any particular artery be cut, it is to be secured, and the part treated as after the removal of similar parts of the hand.

The amputation of *the toes* is exactly similar to that of the fingers.

SECT. VI. *Of removing the ENDS of CARIOUS BONES in the JOINTS.*

In compound fractures, the ends of bones, when they protrude in such a manner that they could not otherwise be returned, have frequently been sawed through; and their place has frequently been supplied by a renewal of bone, so as to preserve the ordinary use of the limb. Many cases have likewise happened, where a large part of the body of the bone has been thrown out by supuration, and its place supplied; and a few are upon record where either the whole of a bone, or that end next the joint, has been thrown out, and its place filled up with callus, so that no inconvenience has been felt. From these circumstances, Mr. White of Manchester was led to preserve an arm, by sawing off the head of a diseased humerus; and Mr. Park of Liverpool, to save a limb, by sawing off the ends of the bones, in a case of white swelling of the knee. When, therefore, it happens that the end of a bone is diseased, while the other parts are sound, the diseased part may be removed, and the sound one saved, so as in a great measure to preserve the free use the limb.

In performing the operation, the first step should be, to use such

means as may enable the operator to have a full management of the circulation of the part affected. Then a longitudinal incision of sufficient length, and perhaps another across it, may be necessary to be made through the soft parts of the joint; and this opening ought to be at a distance from the large blood-vessels, that they may be in no danger of being injured. After the end of the diseased bone is sufficiently laid bare, it is either to be brought out of the joint, or a spatula or some other proper substance is to be introduced between the bone and soft parts, so as to defend the latter in time of sawing the bone. After the diseased part of the bone is removed, the arterial branches are to be secured, and the wound treated like any other wound of equal size.

During the cure, the limb ought to be kept in the posture most favourable for the removal of the bone, and afterwards for the preservation of the natural motion of the joint.

In this way a limb may sometimes be saved which would otherwise have been removed. But though the removal of the diseased end of one bone may be readily effected, the removal of all that part of the bones which enters into the composition of a joint must be attended with so much inconvenience, that it can seldom be useful, unless it be where the ends of bones are destroyed by external violence; for then it appears that this operation may be performed with considerable success.

CHAP. XXXVI. OF CUTANEOUS DISEASES.

THE knowledge of cutaneous diseases has not kept pace with the other branches of surgical science. A considerable share of attention has been given by many, both of the ancient and modern writers, to the investigation of the nature and phenomena of this class of complaints; but whether it has been from the real difficulty of the subject, or from the want of that minuteness of discrimination, which is so necessary for obtaining accurate ideas of diseases characterised principally by their external appearance, our views on this subject have hitherto been very vague and imperfect.

The medical world must, therefore, have much satisfaction in knowing, that, in a recent publication, entitled, "*A Description and Account of the Treatment of Cutaneous Diseases*," by Dr. Willan, the investigation of this obscure subject has occupied the attention of a gentleman so well qualified to do justice to it. Nor will they be disappointed at the perusal of either the first part of the work (on *papulous eruptions*), or of that which more immediately belongs to the subject of the present volume. Both they will find estimable, as well from their clearness and perspicuity, as from the

striking beauty and execution of the plates with which they are illustrated*.

A subject of this kind, which has not hitherto been treated in a systematic form, can scarcely be expected to be perfected by one man, however eminent for his talents or observation. We flatter ourselves, however, that the subject will now be followed up by men of ability; that the descriptions of the author will be compared with the appearances as they present themselves, any varieties or deviations pointed out, and thus what has been long a desideratum in medical science completely supplied.

Before we proceed in describing the treatment of any of the cutaneous affections, the consideration of which has been reserved for this place, it may not be improper to present the reader with a sketch of the arrangement which the author lays down, as well as to subjoin the definition of the terms he employs; which is particularly necessary, as the subject is nearly new.

He arranges cutaneous diseases into seven orders, which are characterised by the different appearances of, 1st, Papulæ—2d, Scales—3d, Rashes—4th, Vesicles—5th, Pustules—6th, Tubercles—7th, Maculæ; and the generic distinctions comprised under each order are as follow:

“ORDER I. Strophulus (red gum, tooth eruption, &c.)—Lichen (spring eruption, scorbutic pimples, &c.)—Prurigo (gratelle, or universal itching of the skin).

“ORDER II. Lepra (leprosy of the Greeks)—Psooriasis (dry or scaly tetter)—Pityriasis (dandriff)—Ichthyosis (fish-skin).

“ORDER III. Rubeola (measles)—Scarlatina (scarlet fever)—Urticaria (nettle-rash)—Roseola (summer-rash, or rose-rash)—Purpura (purple or scorbutic rash)—Erythema (red rash).

“ORDER IV. Erysipelas (St. Anthony's fire)—Pemphigus (vesicular fever)—Pompholyx (water-blebs)—Herpes (ring-worm, shingles, wildfire, &c.)—Varicella (chicken-pox)—Miliaria (miliary eruptions)—Eczema (heat-eruption)—Aphthæ (thrush).

“ORDER V. Impetigo (running scab)—Ecthyma (ulcerated tetter)—Variola (small-pox)—Scabies (itch)—Porrigo (scald head, &c.).

“ORDER VI. Phyma (boils, carbuncles, &c.)—Verruca (warts)—Acne (stone-pock; red, tuberculated face, &c.)—Lupus, or noli me tangere—Elephantiasis (Arabian leprosy)—Frambæsia (yaws).

“ORDER VII. Ephelis (sun-spots)—Nævus—Spilus, moles, and other original marks.”

The definitions he gives are the following:

“I. SCURF (*furfura*); small exfoliations of the cuticle, which

* See the Lond. Med. Review, vol. VII. No. xxxi. from which we draw these remarks.

take place after some eruptions on the skin; a new cuticle being formed underneath during the exfoliation.

“ II. SCALE (*squama*); a lamina of morbid cuticle, hard, thickened, whitish, and opaque.

“ III. SCAB; a hard substance covering superficial ulcerations, and formed by a concretion of the fluid discharged from them.

“ IV. STIGMA; a small red speck in the skin, occasioning no elevation of the cuticle. Stigmata are generally distinct or apart from each other. They sometimes assume a livid colour, and are then termed *petechiæ*.

“ V. PAPULA; a very small and acuminate elevation of the cuticle, with an inflamed base, not containing a fluid, nor tending to suppuration.

“ VI. RASH (*exanthema*); consists of red patches on the skin, variously figured, in general confluent, and diffused irregularly over the body, leaving interstices of a natural colour.

“ VII. MACULA; a permanent discoloration of some portion of the skin, often with a change of its texture, but not connected with any disorder of the constitution.

“ VIII. TUBERCLE; a hard superficial tumor, circumscribed and permanent, or proceeding very slowly to suppuration.

“ IX. VESICLE (*bullæ*); an elevation of the cuticle, of a large size, irregularly circumscribed, and containing a transparent watery fluid. Vesicles with a dark red or liver-coloured base are usually denominated *phlyctenæ*.

“ X. PUSTULE; an elevation of the cuticle, sometimes globose, sometimes conoidal in its form, and containing pus, or a lymph which is in general discoloured.”

The various kinds of pustules are:

“ 1. PHLYZACIUM; a pustule containing pus, and raised on a hard, circular, inflamed base, of a vivid red colour. It is succeeded by a thick, hard, dark-coloured scab.

“ 2. PSYDRACIUM; a minute pustule, irregularly circumscribed, producing but a slight elevation of the cuticle, and terminating in a laminated scab.

“ 3. ACHOR; a pustule, appearing most frequently about the head, which contains a straw-coloured fluid, having the appearance, and nearly the consistence, of strained honey.

“ 4. PHLYCTIS; a small pustule, with a circular base slightly inflamed, containing a lymph, which is sometimes clear and pellucid, but more frequently whitish, like whey, or pearl-coloured. This pustule terminates in a laminated scab.

“ Under this head may be ranked the pustules denominated by authors *hydroa* or *hidroa*, *boas*, *sudamina*, and *miliary pustules*.”

“ The SECOND ORDER, or SCALY DISEASES OF THE SKIN, includes those affections which are characterised by an appearance of scales arising from a morbid state of the cuticle, as specified in the

second definition. The cuticle is not, however, the only seat of these complaints: their real origin seems often to be indurated papulæ, or larger elevations of the true skin, which by pressure, or distension, injure the texture of the cuticle, and produce thickened irregular layers of it. The scales or crusts thus formed have not always been distinguished from scabs succeeding confluent pustules, or superficial ulcerations: whence we find, in medical writers, several dissimilar diseases improperly connected together. I shall endeavour," says Dr. Willan, "to avoid such inaccuracies, by strictly observing the second and third definitions.

"The generic diseases of the present order are, LEPRO, PSORIASIS, PITYRIASIS, and ICTHYOSIS." (See those subjects in Vol. II.)

SECT. I. *Of the LEPROSY.*

"By the term LEPRO," says Dr. Willan, "I mean to express the complaint so denominated by the most accurate of the Greek physicians. It is characterised by scaly patches, of different sizes, but having always nearly a circular form. I have observed, in this country, three varieties of the disease, which may be described under the titles of *Lepra vulgaris*, *Lepra alba*, and *Lepra nigricans*.

1. "The *lepra vulgaris* exhibits first small, distinct elevations of the cuticle, which are reddish, and shining, but never contain any fluid. On their surface, when examined through a magnifier, the cuticular lines are found obliterated: and, within a few hours, a thin white scale is formed on the top of each of them. In three or four days the small elevations appear flattened, and are at the same time dilated, by an extension of their bases, to the size of a silver penny. These patches continue to enlarge gradually, till they nearly equal the dimensions of a crown-piece. They have always an orbicular or oval form, are covered with dry scales, and surrounded by a red border. The scales accumulate on them, so as to form a thick prominent crust, which is quickly reproduced, whether it fall off spontaneously, or may have been forcibly detached. After its removal, the surface appears, through a magnifier, to be porous, and irregular, or wrinkled, but the furrows do not coincide with the lines of the contiguous sound cuticle. No pain or uneasiness attends the above eruption, except that a slight degree of itching is felt when the person affected with it becomes warm in bed, and that a sensation of tingling is produced by sudden changes in the temperature of the atmosphere.

"This species of lepra sometimes appears first at the elbow, or on the fore-arm; but more generally about the knee. In the latter case, the primary patch forms immediately below the patella. Within a few weeks, several other scaly circles appear along the

fore part of the leg and thigh, increasing by degrees till they come nearly into contact. The disease is then often stationary for a considerable length of time. If it does advance further, the progress is towards the hip and loins; afterwards to the sides, back, and shoulders; and about the same time to the arms and hands. In the greater number of cases, the hairy scalp is the part last affected: although the circles formed on it remain for some time distinct, yet they finally unite, and cover the whole surface on which the hair grows with a white scaly incrustation. This appearance is attended, more especially in hot weather, with a troublesome itching; and with a watery discharge for several hours, when any portion of the crust is detached, which takes place from very slight impressions. The pubes in adults is sometimes affected in the same manner as the head: and if the subject be a female, there is usually an internal pruritus pudendi. In some cases of the disorder, the nails, both of the fingers and toes, are thickened, and deeply indented longitudinally. Either the whole, or some part of each nail, is harder, and more prominent than usual. Under several of them also may be observed one, two, or three, round yellowish specks, which, on advancing to the end of the fingers, in consequence of the growth of the nail, will be found to originate from a deposition of curdly sebaceous matter, having an extremely fetid odour.

"When the lepra extends to all the parts above mentioned, it becomes highly disgusting in its appearance, and inconvenient from the stiffness and torpor occasioned by it in the limbs. The disease, however, even in this advanced stage, is seldom disposed to terminate spontaneously. It continues nearly in the same state for several years, or sometimes during the whole life of the person affected, not being apparently connected with any disorder of the constitution.

"A regular mode of diet, with an appropriate medicinal course, acts very slowly on the lepra, yet will at length accomplish its cure. The steps by which it proceeds to a termination are as follow: First, the incrustation separates from about the centres of the patches, and is no longer reproduced. The scales being further and further removed, a circle of red shining cuticle, deeply indented, appears within the original patch, which still retains a broad, hard, scaly ring, or border. This border continues till the cuticle within it assumes the usual colour and texture. It then gradually disappears; and the cuticular lines being extended over it, erase every vestige of the disease."

This form of lepra, the author observes, generally affects both sides, appearing at each elbow, or knee, about the same time, and extending from thence along the limbs in a similar manner; the scaly patches constituting it are generally situated where the bone is nearest the surface; and there is no alteration in the patches first

affected till near the termination, when all of them begin to look better, nearly about the same time. The patches never appear on the cheeks, chin, nose, or near the eyebrows. No disadvantage ever arises from the obstruction of perspiration over a large surface, consequent on this disease. The author confines the term *lepra* to the disease so called by the best Greek writers, and the descriptions given of it in Paulus Ægineta and Actuarius nearly answer to his. The Arabian physicians constantly apply the term *lepra* to the elephantiasis of the Greeks; Celsus, as he does not make use of it at all, probably comprehended it under the general denomination of *impetigo*; and Hippocrates speaks of it as a mere superficial affection rather than a disease.

“The *lepra* is said by some authors to be both contagious and hereditary; experience, however, sufficiently demonstrates that the *lepra vulgaris* is not contagious: but that there is a predisposition to it communicated hereditarily, I can readily admit, having, in several instances, observed it to be thus transmitted. A slow pulse, or a languid circulation of the blood, and, what must generally be connected therewith, a harsh, dry, impermeable state of the skin and cuticle, appear to constitute a fundamental part of the predisposition. From such a state of the integuments, morbid effects arise, more especially at the decline of life: hence the disease much oftener occurs, and is more inveterate, after the age of forty, than at any earlier period; an observation made long ago by Hippocrates and Galen.”

Of the occasional causes, the author lays little stress upon different articles of food; the only ones which he can point out with any certainty, are exposure to cold and moisture, and the accumulation of *fordes* on the skin, to which those are peculiarly liable who work among dry powdery substances.

2. In the *lepra alphas* the scaly patches “are smaller than those of the *lepra vulgaris*; and also differ from them in having their central part depressed or indented. This disorder usually begins about the elbow, with distinct, eminent asperities, of a dull red colour, and not much larger than *papulæ*. These in a short time dilate to nearly the size of a silver penny. Two or three days afterwards, the central part of them suffers a depression, within which, small, white, powdery scales may be observed. The surrounding border, however, still continues to be raised, but retains the same size, and the same red colour as at first. The whole of the fore-arm, and sometimes the back of the hand, is spotted with similar patches; they seldom become confluent, excepting round the elbow, which, in that case, is covered with an uniform, white crust. This affection appears in the same manner upon the joint of the knee, but without spreading far along the thigh or leg. I have seldom seen it on the trunk of the body, and never on the face. It is a disease of long duration, and not less difficult to cure

than the foregoing species of lepra: even when the scaly patches have been removed by persevering in the use of suitable applications, the cuticle still remains red, tender, and brittle, very slowly recovering its usual texture. The small hairs of the skin are not destroyed, as several authors state, nor altered with respect to their colour and texture, in any form of the lepra Græcorum.

“ The causes of the alphas are perhaps nearly the same as those of the lepra vulgaris. It should, however, be observed, that the alphas is found much oftener to affect young persons, than the latter does.

3. “ The *lepra nigricans* differs little from the lepra vulgaris, as to its form or distribution. The most striking difference is in the colour of the patches, which are dark and livid. They appear first on the legs and fore-arms, extending afterwards to the thighs, loins, neck, and hands. Their central part is not depressed as in the alphas. They are somewhat smaller in size than the patches of the lepra vulgaris; and not only is the border livid, or purplish, but the livid colour of the base likewise appears through the scaly incrustation, which is seldom very thick. It is further to be observed, that the scales are more easily detached than in the other forms of lepra, and that the surface remains longer excoriated, discharging lymph, often with an intermixture of blood, till a new incrustation forms, which is usually hard, brittle, and irregular.

“ The lepra nigricans affects persons whose occupation is attended with much fatigue, and exposes them to cold or damp, and to a precarious or improper mode of diet, as soldiers, brewers’ labourers, butchers, stage-coachmen, scullermen, &c. Some women are also liable to it, who are habituated to poor living and constant hard labour.”

In the treatment of lepra, the Greek physicians always premised bleeding, and strong purgative medicines, but depended most on various external applications.

Frequent bathing or washing seems, to the author, the most essentially necessary for the cure of the two first species of lepra; and he thinks, that the sulphureous waters of Moffat, Harrogate, and Croft, are of much service, whether applied externally or internally. He speaks favourably of the use of the Bath waters, from the authority of Dr. Falconer, and of sea bathing; but it seems to him proper, at first to use a bath of warm sea water till the skin be softened, and then to go into the open sea. The plan should be pursued for several successive summers. The simple warm bath may be sufficient in the slighter attacks.

The watery solution of sublimate, and the ung. hydrargyri nitrati, are very efficacious in removing the crust and softening the skin; but they are not preferable to the tar ointment, which, to those effects, joins that of allaying the troublesome itching which often attends the disease. From the experience of the author, an-

timonials, sulphur, and nitre, have no considerable efficacy; nor decoctions of emollient herbs, of guaiacum, sarsaparilla, meze-reon, or elm-bark, nor mercury, except in the form of sublimated in small doses, nor nitrous or marine acid. He has found advantage from the aqua kali puri in the dose of thirty drops three times a-day.

Black and white hellebore, the flesh of vipers, tincture of cantharides, cucumbers, and the herb called Britannica, which seems to be a species of cochlearia, have been extolled by many.

The author gives a communication from Dr. Crichton, on the use of the solanum dulcamara, or bitter-sweet, which we shall give in the doctor's own words:

"It is now upwards of seven years since I first tried the dulcamara for the cure of obstinate diseases of the skin. I was induced to do so by the perusal of a short, but well written, practical essay on the subject, by the learned Professor of Botany in the university of Goettingen, Dr. Althoff. This gentleman relates ten cases of cutaneous eruption, which he describes as analogous to the itch, but not the true itch, all of which were cured by this remedy. He confesses, at the same time, that it failed in a number of others. Professor Althoff, and the other German physicians who employ it, seem to have taken their hint concerning it from the essay of Mons. Carrere on the Dulcamara.

"Out of twenty-three cases of lepra Græcorum, in which I have tried it, two only have resisted its action. All the others were completely cured. That I was not mistaken in the nature of the complaint, you yourself can testify, as you have seen two or three of the cases alluded to, and in all the others the appearance of the disease was similar.

"The true lepra is the only disorder of the skin in which I could venture to assert the dulcamara will generally effect a cure. Next to lepra, it appears to me to do most good in psoriasis and pityriasis. As to the rheumatism, for which it has been so highly praised by Boerhaave, Sauvage, Carrere, Werlhof, and others, I have not found it at all equal to the remedies which are generally employed in this country for the removal of that painful and troublesome disorder. I exhibit the dulcamara as follows:

(No. 144.) *R. Stipitum dulcamaræ unciā j.*

Aquæ puræ libram jss.

Decoque ad libram j. et liquorem frige factum cola.

"Of this decoction, I generally desire the patient to take two ounces, at first, every morning, noon, and evening; but I afterwards increase the quantity until the pint is consumed every day. At the same time I order the patient to wash the skin with a stronger decoction, which greatly accelerates the cure. The remedy seldom begins to exhibit any evident good effects for the first eight days.

"It ought to be remarked, that the dulcamara, when first exhibited to very delicate people, and hysterical women, often produces syncope and slight palpitation of the heart, now and then nausea and giddiness; these symptoms always shew that the quantity exhibited is too large. If a smaller dose be given, and any aromatic tincture added to it, such as the compound spirit of lavender, it ceases to produce such uneasy symptoms."

None of the remedies above mentioned are applicable for the cure of the lepra nigricans. This form of the disease requires, in the first place, a regular and nutritive plan of diet, with moderate exercise: it may be afterwards wholly removed by the use of bark, and the mineral acids, sea-bathing, &c.

SECT. II. PSORIASIS, or SCALY TETTER.

This disease is characterised by a rough and scaly state of the cuticle, sometimes continuous, sometimes in separate patches of various sizes, but of an irregular figure, and for the most part accompanied with rhagades, or fissures in the skin. From the lepra it may be distinguished by being more superficial, variously figured, and throwing off bran-like patches; by its cessation and recurrence at certain seasons; and by its being usually attended with a disorder of the constitution. Celsus describes psoriasis as a species of impetigo, and some medical authors give it the denomination of psora, or scabies sicca.

Dr. Willan describes the varieties of this complaint under the names of *psoriasis guttata*, *psoriasis diffusa*, *psoriasis gyrata*, *psoriasis palmaria*, *psoriasis labialis*, *psoriasis scrotalis*, *psoriasis infantilis*, *psoriasis inveterata*.

1. "The *psoriasis guttata* appears in small distinct, but irregular, patches of laminated scales, with little or no inflammation round them. The patches very seldom extend to the size of a sixpence: they have not an elevated border, nor the oval or circular form by which all the varieties of lepra are distinguished; but their circumference is sometimes angular, and sometimes goes into small serpentine processes. The scale formed upon each of them is thin, and may be easily detached, leaving a red, shining base. The patches are often distributed over the greatest part of the body, but more particularly on the back part of the neck, the breast, arms, loins, thighs, and legs. They appear also on the face, which rarely happens in lepra; in that situation they are red, and more rough than the adjoining cuticle, but not covered with scales.

"The *psoriasis guttata* often appears on children in a sudden eruption, attended with a slight disorder of the constitution, and spreads over the body within two or three days. In adults, it

commences with a few scaly patches on the extremities, proceeds very gradually, and has a longer duration than in children. Its first occurrence is usually in the spring season, after violent pains in the head, stomach, and limbs: during the summer it disappears spontaneously, or may be soon removed by proper applications; but it is apt to return again early in the ensuing spring, and continues so to do for several successive years. When the scales have been removed, and the disease is about to go off, the small patches have a shining appearance: and they retain a dark red, intermixed with somewhat of a blueish colour, for many days, or even weeks, before the skin is restored to its usual state.

“ In the venereal disease there is an eruption which very much resembles the *psoriasis guttata*, the only difference being a slighter degree of scaliness, and a different shade of colour in the patches, approaching to a livid red, or very dark rose colour.

“ This eruption is usually seen upon the forehead, breast, between the shoulders, or in the inside of the fore-arms, in the groins, about the inside of the thighs, and upon the skin covering the lower part of the abdomen.

“ When mercury is administered, the little scales are soon detached and fall off; but the discolouration still remains, though it becomes gradually fainter as the mercurial course proceeds; and some vestiges of the cutaneous affection usually appear for two or three weeks after all the venereal symptoms have been removed.

“ The syphilitic *psoriasis guttata* is attended with, or soon followed by, an ulceration of the throat. It appears about six or eight weeks after a chancre has been healed by an ineffectual course of mercury: a similar appearance takes place at nearly the same period, in some cases where no local symptoms had been noticed. When a venereal sore is in a discharging state, this eruption, or other secondary symptoms, often appear much later than the period above mentioned. They may also be kept back three months, or even longer, by an inefficient application of mercury. If no medicines be employed, the syphilitic form of the *psoriasis guttata* will proceed during several months, the number of the spots increasing, and their bulk being somewhat enlarged, but without any other material alteration.

2. “ The *psoriasis diffusa* spreads into large patches irregularly circumscribed, reddish, rough, and chappy, with scales interspersed. It commences, in general, with numerous minute asperities, or elevations of the cuticle, more perceptible by the touch, than by sight. Upon these, small distinct scales are soon after formed, adhering by a dark central point, while their edges may be seen white and detached. In the course of two or three weeks, all the intervening cuticle becomes rough and chappy, appears red, and raised, and wrinkled, the lines of the skin sinking into deep furrows. The scales which form among them are often slight, and

repeatedly exfoliate. Sometimes, without any previous eruption of papulæ, a large portion of the skin becomes dry, harsh, cracked, reddish, and scaly, as above described. In other cases the disorder commences with separate patches of an uncertain form and size, some of them being small, like those in the psoriasis guttata, some much larger. The patches gradually expand till they become confluent, and nearly cover the part or limb affected. Both the psoriasis guttata, and diffusa, likewise occur as a sequel of the lichen simplex. This transition takes place more certainly after frequent returns of the lichen.

“ The parts most affected by the psoriasis diffusa are the cheeks, chin, upper eyelids, and corners of the eyes, the temples, the external ear, the neck, the fleshy parts of the lower extremities, and the fore-arm from the elbow to the back of the hand along the supinator muscle of the radius: the fingers are sometimes nearly surrounded with a loose, scaly incrustation; the nails crack and exfoliate superficially. The scaly patches likewise appear, though less frequently, on the forehead and scalp, on the shoulders, back, and loins, on the abdomen, and instep. This disease occasionally extends to all the parts above mentioned at the same time, but in general it affects them successively, leaving one place free, and appearing in others, sometimes again returning to its first situation.

“ The psoriasis diffusa is attended with a sensation of heat, and with a very troublesome itching, especially at night: it exhibits small, slight, distinct scales, having less disposition than the lepra to form thick crusts. The chaps or fissures in the skin, which usually make a part of this complaint, are very sore and painful, but seldom discharge any fluid. When the scales are removed by frequent washing, or by the application of unguents, the surface, though raised and uneven, appears smooth and shining: and the deep furrows of the cuticle are lined by a slight scaliness. Should any portion of the diseased surface be forcibly excoriated, there issues out a thin lymph mixed with some drops of blood, which slightly stains and stiffens the linen, but soon concretes into a thin, dry scab: this is again succeeded by a white scaliness, gradually increasing, and spreading in various directions. As the complaint declines, the roughness, chaps, scales, &c. disappear; and a new cuticle is formed, at first red, dry, and shrivelled, but which, in two or three weeks, acquires the proper texture.

“ Symptoms of general disorder attend the first appearance of the psoriasis diffusa, as headach, inappetence, pain or sickness at stomach; pains, cramps, and coldness of the extremities, with a sense of universal languor and debility. During the progress of the eruption, these symptoms abate, or wholly disappear; but they, for the most part, precede any returns of the complaint, which usually take place in winter, or early in the spring. The duration of the psoriasis diffusa is from one to four months.

" The complaint denominated with us the *baker's itch*, is an appearance of the *psoriasis diffusa* on the back of the hand, commencing with one or two small, rough, scaly patches, and finally extending from the knuckles to the wrist. The rhagades, or chaps and fissures of the skin, are numerous about the knuckles, and ball of the thumb, and where the back of the hand joins the wrist. They are often highly inflamed and painful, but have no discharge of fluid from them. The back of the hand is a little raised or tumefied, and, at an advanced period of the disorder, exhibits a reddish, glossy surface, without crusts, or numerous scales. This complaint is not general among bakers: it is only aggravated by their business, and affects those who are otherwise disposed to it.

" The *grocer's itch* has some affinity with the baker's itch, or tetter; but, being usually a pustular disease at its commencement, it probably belongs to another genus.

" *Washerwomen*, probably from the irritation of soap, are liable to be affected with a similar scaly disease on the hands and arms, sometimes on the face and neck, which, in particular constitutions, proves very troublesome, and of long duration.

" The venereal disease rarely assumes the form of *psoriasis diffusa*.

3. " The *psoriasis gyrata* is distributed in narrow patches or stripes, variously figured: some of them are nearly longitudinal; some circular, or semicircular, with vermiform appendages; some are tortuous, or serpentine; others like earth-worms or leeches: the furrows of the cuticle being deeper than usual, make the resemblance more striking, by giving to them an annulated appearance. There is a separation of slight scales from the diseased surface, but no thick incrustations are formed. The uniform disposition of these patches is singular: I have seen a large circular one situated on each breast above the papilla; and two or three others of a serpentine form, in analogous situations along the sides of the chest. The back is often variegated in like manner, with convoluted tetter-like patches similarly arranged on each side of the spine. They likewise appear in some cases on the arms and thighs, intersecting each other in various directions. A lighter kind of this complaint affects delicate young women and children in small scaly circles or rings, little discoloured: they appear on the cheeks, neck, or upper part of the breast, and are mostly confounded with the herpetic or pustular ring-worm.

" The *psoriasis gyrata* has its remissions and returns, like the *psoriasis diffusa*; it also exhibits, in some cases, patches of the latter disorder on the face, scalp, or extremities, while the trunk of the body is chequered with the singular figures above described."

There is occasionally an appearance in the venereal disease, somewhat analogous to the *psoriasis gyrata*, in which the tetter-like patches assume the form of a crescent or horse-shoe; or appear as rings,

either oval or circular, the central part being neither scaly nor discoloured. If the progress is not stopped by medicines, these become at last superficial ulcerations.

4. "The *psoriasis palmaria* is an obstinate species of tetter, nearly confined to the palm of the hand. It commences with a small, harsh, or scaly patch, which gradually spreads over the whole palm, and sometimes appears in a slighter degree on the inside of the fingers, and wrist. The surface feels rough, from the detached and raised edges of the scaly laminae: its colour often changes to brown, or black, as if dirty; yet the most diligent washing produces no favourable effect. The cuticular furrows are deep, and cleft at the bottom longitudinally in various places, so as to bleed on stretching the fingers. A sensation of heat, pain, and stiffness in the motions of the hand, attends this complaint: it is worst in winter or spring, and occasionally disappears in autumn or summer, leaving a soft, dark, red cuticle: but many persons are troubled with it for a series of years, experiencing only very slight remissions. Every return or aggravation of it is preceded by an increase of heat, and dryness, with intolerable itching.

"Shoemakers have the *psoriasis palmaria* locally, from the irritation of the wax they so constantly employ. In *brasiers*, *tinmen*, *silversmiths*, &c. the complaint seems to be produced by handling cold metals. A long predisposition to it from a weak, languid, hectic, state of the constitution, may give effect to different occasional causes. We have observed it in women after lying-in; in some persons it is connected, or alternates, with arthritic complaints."

Sometimes, Dr. Willan observes, a similar appearance takes place on the soles of the feet; and sometimes, in this disease, there is a thickening of the preputium, attended with painful cracks, and producing, at length, phymosis.

5. "*Psoriasis labialis*. The *psoriasis* sometimes affects the proboscium without appearing on any other part of the body. Its characteristics are, as usual, scabiness intermixed with chaps, and fissures of the skin. The scales are of a considerable magnitude, so that their edges are often loose while the central points are attached. A new cuticle gradually forms beneath the scales, but it is not durable: in the course of a few hours it becomes dry, shrivelled, and broken; and, while it exfoliates, gives way to another layer of tender cuticle, which soon in like manner perishes. These appearances should be distinguished from the slight chaps and roughness of the lips produced by very cold or frosty weather, but easily removed. The *psoriasis labialis* may be a little aggravated by frost, or sharp winds, yet it receives no material alleviation from an opposite temperature: it is not indeed confined within any certain limit, or period of duration, having in several instances been protracted through all the seasons. The under lip is always

more affected than the upper : and the disease takes place more especially in those persons whose lips are full and prominent.

6. "*Psoriasis scrotalis*. The skin of the scrotum may be affected, in the psoriasis diffusa, like other parts of the surface of the body : but sometimes a roughness and scabiness of the scrotum appears as an independent complaint, attended with much heat, itching, tension, and redness. The above symptoms are succeeded by a hard, thickened, brittle texture of the skin, and by painful chaps, or excoriations, which are not easy to be healed. This complaint is sometimes produced under the same circumstances as the prurigo scroti, and appears to be in some cases a sequel of it. A species of the psoriasis scrotalis likewise occurs in the lues venerea, but merits no particular attention, being always combined with other secondary symptoms of the disease.

7. "*Psoriasis infantilis*. " Infants between the ages of two months and two years are occasionally subject to the dry tetter. Irregular, scaly patches, of various sizes, appear on the cheeks, chin, breast, back, nates, and thighs : they are sometimes red, and a little rough, or elevated, sometimes excoriated, then again covered with a thin incrustation, and lastly intersected by chaps or fissures. The general appearances nearly coincide with those of the psoriasis diffusa."

It is extremely difficult to distinguish the general appearance of the psoriasis infantilis, from the scaly patches which occur in infants, as secondary symptoms of the lues venerea. The latter are generally accompanied with a sore throat, and a peculiar hoarse sound in the child's crying, which assists those who are attentive, and experienced in forming a diagnosis.

8. "*Psoriasis inveterata* is characterised by an almost universal scabiness, with a harsh, dry, and thickened state of the skin. It commences from a few irregular, though distinct, patches on the extremities. Others appear afterwards on different parts, and, becoming confluent, spread at length over all the surface of the body, except a part of the face, or sometimes the palms of the hands, and soles of the feet. The skin is red, deeply furrowed, or wrinkled, stiff and rigid, so as somewhat to impede the motion of the muscles, and of the joints. So quick, likewise, is the production and separation of scales, that large quantities of them are found in the bed on which a person affected with this disease has slept. They fall off in the same proportion by day, and, being confined within the linen, excite a troublesome and perpetual itching. An incrustation of the scalp forms in the manner stated under the article lepra vulgaris. The nails of the fingers and toes become convex, and are thickened at their extremities. A frequent renewal of them takes place, the new nails soon assuming the morbid form. At their articulations, the thumb and fingers are enlarged, and contracted, or in some cases retorted. On the

abdomen the skin is very red, deeply indented, and brittle: no thick incrustation forms, but the scales appear thin, and semitransparent, peeling off from time to time in large flakes. Painful excoriations are occasioned by the pressure of some parts of the clothing, or by the attrition of contiguous surfaces, as of the nates, groin, thighs, scrotum, &c. At an advanced period of the disease, the cuticle is often more extensively destroyed: I have indeed," says Dr. Willan, "seen all the extremities, the back, and nates, excoriated at the same time, with a very profuse discharge of thin lymph from the surface. In the course of a few weeks, however, that discharge usually abates, when a new cuticle is formed, of a dry, harsh, or almost horny texture, and which from time to time separates in large pieces. The same circumstances are frequently repeated; and the disease proceeds on without any considerable remission for an indeterminate length of time, especially in old people. Young persons are not so liable to it: nevertheless, I have seen it in some under thirty years of age, and in others before the time of puberty, arising, perhaps, from a strong hereditary disposition."

The psoriasis diffusa occasionally becomes permanent and inveterate, like the last-mentioned complaint.

Psoriasis, when of considerable extent, seems to be always connected with some disease of the constitution; and it is not contagious: it most frequently occurs in those who have the sanguineous, combined with the melancholic, temperament. Women are more liable to it than men, and they more particularly after lying-in. It frequently also occurs in young women labouring under chlorosis, and proves, in that case, very obstinate.

Of the exciting causes, Dr. Willan observes, that "food, difficult of digestion, eating too great a quantity of acid fruits, the unseasonable use of the cold bath, large draughts of cold water taken when the body has been heated by exercise, and some improper mixtures of food, as of milk and fish, are the circumstances to which patients refer the complaint when it appears in a sudden eruption on the skin: and such causes will," he apprehends, "be deemed sufficient to excite the disease in those who are predisposed to it constitutionally."

"This disease generally occurs," according to the author's observations, "in the spring season, when the changes of the state of the atmosphere are most frequent and severe."

The sudden application of cold will sometimes produce a retrocession of psoriasis; and whenever this occurs, there is vomiting and great disturbance in the system, which are best removed by the re-appearance of the eruption. On this subject, as on several others treated in this work, the author's observations and those of Dr. Falconer, of Bath, nearly coincide.

"The three first species of psoriasis, when they appear in a

sudden eruption, attended with febrile symptoms, may be advantageously treated by administering in the evening an emetic dose of ipecacuanha, and the following day two or three grains of calomel, or some other gentle purgative: afterwards, by the use of fixed alkali, either in its concretè or liquid form, by a light moderate diet, by frequently washing with tepid water, and by abstinence from fruits, acids, and fermented liquors, the above disorders may be brought to a conclusion within two or three weeks. But should the scaly patches, through neglect at their first appearance, or from an unhealthy state of the constitution, have enlarged considerably, and spread over the greater part of the body, a more elaborate plan will be necessary." This consists of the free use of antimonials, of the warm bath, with repeated friction, and of the chalybeate or sulphureous waters of different parts of the island. The decoctions of elm bark, sarsaparilla, dulcamara, &c. have also their share of utility.

"The *psoriasis inveterata* requires the same plan of treatment as the *lepra vulgaris* and *alphos*.

"For the *psoriasis palmaria* the same internal remedies are proper as for the other forms of the disease; vapour of hot water, oiled silk gloves, and diluted ung. nitratum, will occasionally be useful.

"In the *psoriasis labialis* it is necessary to have the lips almost constantly covered with some mild unguent or plaster; to avoid cold; to be temperate; and to take suitable stomachic medicines for the flatulence, &c.

"In the *psoriasis scrotalis*, besides the use of general remedies, care should be taken to keep the parts clean by washing them with warm water, water-gruel, &c. and to prevent the effects of attrition by unguent composed of three parts of unguentum ceræ, and one part of the unguentum hyd:argyri nitrati.

"The scaly tetter of infants may be relieved by the use of antimonials, and by warm bathing, or washing with water-gruel. When considerable excoriations take place, it is proper to use mild applications, as the ceratum lapidis calaminaris, and unguentum cerussæ acetatæ, mixed in equal proportions. Calomel is occasionally necessary, when there are inflamed pustules, or tubercles."

SECT. III. PITYRIASIS, or DANDRIF.

This consists of irregular patches of small, thin scales, which repeatedly form, and separate; but never collect into crusts, nor are attended with redness, or inflammation, as in the *lepra*, and scaly tetter. There are two varieties of it, the *pityriasis capitis*, and *pityriasis versicolor*.

1. "*Pityriasis capitis*, when it affects very young infants, is termed by nurses the *dandriff*. It appears, at the upper edge of

the forehead and temples, as a slight whitish scurf set in the form of a horse-shoe: on other parts of the head there are large scales, at a distance from each other, flat, and semi-pellucid. Sometimes, however, they nearly cover the whole of the hairy scalp, being close together, and imbricated. A similar appearance may take place in adults, but it is usually the effect of lepra, scaly tetter, or some general disease of the skin. Elderly persons have the pityriasis capitis in nearly the same form as infants: the only difference is, that this complaint in old people occasions larger exfoliations of the cuticle.

“ When the hair is thin, or the head shaven, the scales may, with a little attention, be removed by the use of soap and warm water, or by a slight alkaline lotion. To enforce this practice is particularly necessary: for if scales intermixed with fordes be permitted to cover the scalp for a length of time, pustules, containing an acrimonious lymph, are formed under the incrustation, and the true porrigo often supervenes, which is a disease of the scalp terminating in suppuration.

2. “ The *pityriasis versicolor* chiefly affects the arms, breast, and abdomen. It is diffused very irregularly, and being of a different colour from the usual skin-colour, it exhibits a singular, chequered appearance. The irregular patches, which are at first small, and of a brown or yellow hue, appear at the scrobiculus cordis, about the mammæ, clavicles, &c. Enlarging gradually, they assume a tessellated form; in other cases they are branched, so as to resemble the foliaceous lichens growing on the bark of trees; and, sometimes, when the discolouration is not continuous, they suggest the idea of a map, being distributed on the skin like islands, continents, peninsulas, &c. All the discoloured parts are slightly rough, with minute scales, which soon fall off, but are constantly replaced by others. This scurf, or scaliness, is most conspicuous on the sides, and epigastric region. The cuticular lines are somewhat deeper in the patches than on the contiguous parts: but there is no elevated border, or distinguishing boundary between the discoloured part of the skin, and that which retains its natural colour. The discolouration rarely extends over the whole body. It is strongest and fullest round the umbilicus, on the breasts, and sides: it seldom appears in the skin over the sternum, or along the spine of the back. Interstices of proper skin-colour are most numerous and largest at the lower part of the abdomen and back, where the scales are often small, distinct, and a little depressed. The face, nates, and lower extremities, are least affected: the patches are found upon the arms, but mostly on the inside, where they are distinct, and of different sizes.”

It is not a cuticular disease, for on removing the cuticle the fallow colour remains as before. It is not attended with any internal disorder, is not limited to any age or sex, and is always of con-

siderable duration. Its causes, the author has not been able to point out with certainty. Though it is not a disorder of any serious consequence, yet the author thinks it proper that it should be well understood, in order that it may not be mistaken for a syphilitic symptom. "I cannot," says he, "speak favourably of my success in the medicinal treatment of this species of pityriasis. Acids, alkalies, mercurials, and antimonials, under whatever form, seemed to produce no beneficial effect. Some advantage was, however, derived from using first a warm bath of sea-water, and afterwards bathing in the open sea: and in one instance the complaint was by this means wholly removed.

SECT. IV. ICTHYOSIS, or FISH-SKIN.

The characteristic of *ichthyosis* is a permanently harsh, dry, scaly, and, in some cases, almost horny texture of the integuments of the body, unconnected with internal disorder. Psoriasis and lepra differ from this affection in being but partially diffused, and in having deciduous scales.

"The arrangement and distribution of the scales in *ichthyosis* are peculiar. Above and below the olecranon on the arm, and in a similar situation with respect to the patella on the thigh and leg, they are small, rounded, prominent or papillary, and of a black colour. Some of the scaly papillæ have a short, narrow neck, and broad, irregular tops. On some parts of the extremities, and on the trunk of the body, the scales are flat and large, often placed like tiling, or in the same order as scales on the back of a fish; but in a few cases they have appeared separate, being intersected by whitish furrows. There is usually, in this complaint, a dryness and roughness of the soles of the feet; sometimes a thickened and brittle state of the skin in the palms of the hands, with large painful fissures; and, on the face, an appearance of scurf rather than of scales. The inner part of the wrists, the hams, the inside of the elbow, the furrow along the spine, the inner and upper part of the thighs, are perhaps the only portions of the skin always exempt from the scaliness. Patients affected with *ichthyosis* are occasionally much harassed with inflamed pustules, or with large, painful boils on different parts of the body: it is also remarkable that they never seem to have the least perspiration or moisture of the skin.

"This disease did not, in any case that presented, appear to have been transmitted hereditarily; nor was more than one child from the same parents affected with it. In several instances, the disease was said to have been connate, and in others to have occurred two or three months after birth; in one case it appeared

soon after the small-pox, at the age of two years, and had continued six or seven years without alteration.

“When a portion of the hard, scaly coating is removed, it is not soon produced again. The easiest mode of removing the scales is to pick them off carefully, with the nails, from any part of the body, while it is immersed in hot water. The layer of cuticle which remains after this operation is harsh and dry; and the skin did not, in the cases that occurred, recover its usual texture and softness; but the scales were prevented from forming afterwards by the repeated use of the warm bath, along with moderate friction.”

Dr. Willan informs us, from Buffon, that the inhabitants of Paraguay are very subject to this complaint; and he also quotes a case from the Philosophical Transactions, Vol. XIV. similar to what he describes. It is of a man of 40 years of age, who was affected, a few weeks after his birth, with a thickening of the skin, and the gradual formation of thick rustling scales of a dark colour, covering every part of his body, except his face, the palms of his hands, and the soles of his feet. This covering was without pain or uneasiness, and he shed it every year. He had six children, all of whom had the same covering, and, as well as himself, were free from it during the time of their having the small-pox. Only one of them was living in the year 1754, whom the writer of this account saw with the father.

A similar state of the skin to that in ichthyosis, but in a much slighter degree, occurs sometimes in the extremities of a person after long ill health; on the healing of inveterate ulcers of the legs; and in some cases of anasarca.

The author has never seen a case of *ichthyosis cornea*; but concludes with mentioning two; one from the Philosophical Transactions, Vol. XLVIII. Part 2, the other from the Philosophical Transactions, No. CLXXVI. In the former, the skin over the whole body (that of a young woman of 17 years of age) was hard to the touch, like wood or a dry hide; it prevented the free motion of any of the muscles, gave her a sense of tightness after eating, had lost its natural warmth, and was insensible, except to pressure by the nails or a pin. She never sweated, and the urine was in considerable quantity, and loaded with salt.

The latter case is of a girl of 13 or 14 years of age, who was affected from her third year with horny excrescences from various parts of the body, particularly the joints, both large and small, which were fastened to the skin like warts, and sometimes fell off, and were renewed.

SECT. V. *Of the HERPES SERPIGO, or RING-WORM.*

This disease has not been well discriminated by any author, but it is one with which few practitioners are unacquainted.

The following account of a method employed in Bengal for the cure of the cutaneous disease, commonly known by the name of Ring-worm, by means of cassunda vinegar, was published by Dr. Adam Freer, on the Bengal establishment:

This disorder, called by the natives *daud*, the author observes, is extremely tormenting during the rainy season, and particularly affects Europeans. It makes its appearance on the thighs, and sometimes spreads over the trunk of the body, neck, and face, obstinately resisting the common remedies in cuticular affections, as preparations of lead, sulphur, and even mercury. From the recommendation of Mr. James Champain, of Patna, Dr. F. employed in this disease a decoction, in vinegar, of a common shrub, the cassunda (*cassia foppera*, Linn.) "Since that time," he observes, "I have used with the best success, an ounce of the fresh bark, roots, tops, or flowers of the cassunda, cut small and boiled with a pint of good wine-vinegar, in an earthen vessel, to eight ounces.

This vinegar, when cooled and strained, is to be kept for use in a glass bottle well stoppered. A drachm or two of the vinegar thus prepared, and applied to the parts affected two or three times a-day, washing with soap and water, and drying the parts with a towel previous to each application of the vinegar, is generally sufficient to remove the disorder. This vinegar may be kept for a year without any sensible diminution of its virtues.

"It has been observed, that the cassunda vinegar does not always prevent a return of the complaint in the succeeding year, and that sometimes cases do occur, so obstinate and inveterate, as to be little affected by it. I have met with very few of these cases; but when they do occur, a purgative occasionally repeated for three or four times, a vegetable diet, the daily use of cows-whey, and a calomel pill every night at bed-time, soon remove the disorder.

"Although it be not always necessary, perhaps a bleeding, the warm bath, and a course of the diet mentioned, before the use of the cassunda in any form, is advisable."

SECT. VI. *Of the ELEPHANTIASIS.*

The best account any-where given of this disease, is that by Dr. Heberden, published in the first volume of the Medical Transactions. According to him, frequently, the first symptom is a sudden eruption of tubercles, or bumps of different sizes, of a red colour, more or less intense (attended with great heat and itching),

on the body, legs, arms, and face: sometimes in the face and neck alone, at other times occupying the limbs only: the patient is feverish; the fever ceasing, the tubercles remain indolent, and in some degree scirrhus, of a livid or copper colour, but sometimes of the natural colour of the skin, or at least very little altered; and sometimes they, after some months, ulcerate, discharging a fetid ichorous humour in small quantity, but never laudable pus.

The features of the face swell and enlarge greatly; the part above the eye-brows seem inflated; the hair of the eye-brows falls off, as does the hair of the beard; but Dr. Heberden has never seen any one whose hair has not remained on his head. The *alæ nasi* are swelled and scabrous; the nostrils patulous, and sometimes affected with ulcers, which, corroding the cartilage and *septum nasi*, occasion the nose to fall. The lips are tumid; the voice is hoarse; which symptom has been observed when no ulcers have appeared in the throat, although sometimes both the throat and gums are ulcerated. The ears, particularly the lobes, are thickened, and occupied by tubercles. The nails grow scabrous and rugose, appearing somewhat like the rough bark of a tree; and the distemper advancing, corrodes the parts gradually with a dry sordid scab or gangrenous ulcer; so that the fingers and toes rot and separate joint after joint. In some patients the legs seem rather posts than legs, being no longer of the natural shape, but swelled to an enormous size, and indurated, not yielding to the pressure of the fingers; and the superficies is covered with very thin scales, of a dull whitish colour, seemingly much finer, but not so white as those observed in the *lepra Græcorum*. The whole limb is overspread with tubercles, interspersed with deep fissures; sometimes the limb is covered with a thick moist scabby crust, and not unfrequently the tubercles ulcerate. In others the legs are emaciated, and sometimes ulcerated; at other times affected with tubercles without ulceration. The muscular flesh between the thumb and fore-finger is generally extenuated.

The whole skin, particularly that of the face, has a remarkably shining appearance, as if it were varnished or finely polished. The sensation in the parts affected is very obtuse, or totally abolished; so that pinching, or puncturing the part, gives little or no uneasiness; and in some patients, the motion of the fingers and toes is quite destroyed. The breath is very offensive; the pulse in general weak and slow.

The disease often attacks the patient in a different manner from that above described, beginning almost insensibly; a few indolent tubercles appearing on various parts of the body or limbs, generally on the legs or arms, sometimes on the face, neck, or breast, and sometimes in the lobes of the ears, increasing by very slow degrees, without any disorder, previous or concomitant, in respect of pain or uneasiness.

To distinguish the disease from its manner of attacking the patient, Dr. Heberden styles the first by *fluxion* and the other by *congestion*. That by fluxion is often the attendant of a crapula, or surfeit from gross foods; whereby, perhaps, the latent seeds of the disorder yet dormant in the mass of blood are excited; and probably from frequent observations of this kind (the last meal always having the blame laid on it), it is, that, according to the received opinion, either fish (the tunny, mackarel, and shell-fish, in particular), melons, cucumbers, young garden beans, or mulberries, eaten at the same meal with butter, cheese, or any preparation with milk, are supposed to produce the disease, and are accordingly religiously avoided.

Violent commotions and agitation of the mind, as anger, fear, and grief, have more than once been observed to have given rise to the disorder: and more frequently, in the female sex, a sudden suppression of an accustomed evacuation, by bathing the legs and feet in cold water at an improper season.

The disorder that occurs by fluxion is what is the ofteneft endeavoured to be remedied by timely applications; that by congestion, not being so conspicuous, is generally either neglected or attempted to be concealed, until perhaps it be too late to be cured; at least unless the patients would submit to a longer course of medicine and stricter regimen of diet than they are commonly inclined to adopt.

Several incipient disorders by fluxion have been known to yield to an antiphlogistic method, as bleeding, refrigerant salts, the saline draughts, and a solution of crystals of tartar in water, for common drink (by this means endeavouring to precipitate part of the peccant matter, perhaps too gross to pass the pores by the kidneys); and when once the fever is overcome, the Peruvian bark combined with saffrafras is the remedy principally to be relied on. The only topical medicine prescribed by Dr. Heberden, was an attenuating embrocation of brandy and alkaline spirits. By the same method some confirmed cases have been palliated. But, excepting in one patient, he never saw or heard of a confirmed elephantiasis radically cured. He adds, however, that he never met with another patient possessed with prudence and perseverance enough to prosecute the cure as he ought.

Dr. Temple speaks of the cure in the following way:

This disease has generally been found incurable. The warm bath should be ordered; if the patient is plethoric, and inflammatory symptoms are present, bleeding and cooling laxatives, such as cryst. tart. with a light diet, should be advised. When this state is removed, some advantage has been thought to have been derived from the cinchona. Issues are advised, and the following embrocation:

(No. 145.) R Spt. vin. ten. ℥viij.

Aq. kali ℥j.

Aquæ ammoniæ ℥ij. M. fiat Embrôcatio.

The following he also says may be tried :

(No. 146.) R Calomel. ppt.

Sulph. antimon. præcipit. aa ʒj.

Mic. panis q. f.

Misce fiat pill. No. x. capt. j. vel. ij. mane et vespere quotidie.

That exploded remedy, the flesh and fat of vipers, it appears, has been lately again introduced into practice, and said to be of service in this disease.

In the New Medical Journal, *white arsenic* is recommended as a cure for the elephantiasis, in an extract from the Asiatic Researches. It is directed in the following manner :

“ Take of *white arsenic, fine and fresh, one part ; of picked black pepper, six parts.*

“ Let both be beaten well, at intervals, for four days successively, in an iron mortar, and then reduced to an impalpable powder in one of stone, with a stone pestle, and thus completely levigated, a little water being mixed with them, make pills of them as large as tares or small pulse, and keep them dry in a shady place.

“ One of these pills must be taken morning and evening, with some betel leaf, or, in countries where the betel is not to be had, with cold water ; if the body be cleansed from foulness and obstructions by gentle cathartics and bleeding, before the medicine is administered, the remedy will be speedier.”

Every practitioner, however, should be extremely cautious of employing this dangerous remedy, either in this or any other case. When it is employed, however, we are disposed to recommend the *arsenicated kali* in preference to the above formula.

Dr. Hugh Smith asserts, that antimonial remedies are preferable in this disease to mercurials ; but we apprehend they are best joined, as in (No. 124. Vol. I.) The doctor gives us the following formulæ :

(No. 147.) R Antimon. crud. ʒß.

Conf. cochlear. hort. ʒj.

Syr. simp. q. f.

Fiat Bol. bis die sumend. superbibend. decoct. seq. ℥ßß.

(No. 148.) R Cort. ulmi recent. ℥j.

Coque ex aq. fontan. q. f. ad colatur. ℥viiij.

(No. 149.) R Unguent. simp. ℥ij.

Ceruss. acetat. ʒj.

Misce fiat Linimentum partib. affect. applicandum.

The doctor also recommends the alterative pill (No. 103. Vol. I.)

SECT. VII. FRAMBÆSIA, or the YAWS.

The description which is given of the nature of this disease by the anonymous author of a paper in the sixth volume of the Edinburgh Medical Essays (art. 76.) differs, in some circumstances, from one that Sauvages received from M. Virgile, an eminent surgeon of Montpellier, who practised twelve years in the island of St. Domingo; and, therefore, he distinguishes the *Frambæsia* into two species, *Guineensis* and *Americana*.

The *frambæsia Guineensis* is said by the first-mentioned writer to be so common on the coast of Guinea and other parts of Africa, that it seldom fails to attack each individual of both sexes, one time or other, in the course of their lives; but most commonly during childhood or youth. "It makes its appearance in little spots on the cuticle, level with the skin, at first no larger than a pin's head, which increase daily, and become protuberant like pimples; soon after the cuticle frets off, and then, instead of finding pus or ichor in this small tumor, only white sloughs or fordes appear, under which is a small red fungus, growing out of the cutis, increasing gradually to very different magnitudes, some less than the smallest wood strawberry, some as big as a raspberry, and others exceeding in size even the largest mulberries; which berries they very much resemble, being knobbed as they are." These protuberances, which give the name to the disease, appear on all parts of the body: but the greatest numbers, and the largest sized, are generally found in the groins, and about the pudenda or anus, in the arm-pits, and on the face: when the yaws are very large, they are few in number; and when remarkably numerous, they are less in size. The patients, in all other respects, enjoy good health, do not lose their appetite, and seem to have little other uneasiness than what the sores occasion.

M. Virgile describes the species of yaws that is common among the negroes of St. Domingo, and which Sauvages has termed *frambæsia Americana*, as beginning from an ulcer that breaks out indiscriminately in different parts of the body, though most commonly on the legs; at first superficial, and not different from a common ulcer in any other circumstances save its not healing by the usual applications; sooner or later, numerous fungous excrescences break out on the surface of the body, as before described, like little berries, moist, with a reddish mucus. Besides these, the soles of the feet and palms of the hands become raw, the skin fretting off, so as to leave the muscles bare; these excoriations are sometimes moist with ichor, and sometimes dry, but always painful, and consequently very distressing. They are mentioned also by the author of the article in the Medical Essays; and both he and M. Virgile observe, that there is always one excrescence, or yaw,

of an uncommon size, longer in falling off than the others, and which is considered as the *master-yaw*, and so termed. An ingenious inaugural dissertation on the subject of the yaws was also published at Edinburgh by Dr. Jonathan Anderson Ludford, now physician in Jamaica. The author of that dissertation considers Dr. Cullen as improperly referring framboesia to the class of cachexiæ. He thinks that this disease ought rather to be referred to the exanthemata; for, like the small-pox, he tells us it has its accession, height, and decline. It begins with some degree of fever, either more or less violent; it may be propagated by inoculation; and it attacks the same individual only once in the course of a life-time, those who once recover from the disease being never afterwards affected with it. These particulars respecting framboesia are rested not merely on the authority of Dr. Ludford, but are supported also by the testimony of Dr. William Wright, a physician of distinguished eminence, who, while he resided in Jamaica, had, in the course of an extensive practice, many opportunities of observing this disease, and to whom Dr. Ludford acknowledges great obligations for having communicated to him many important facts respecting it.

Dr. Ludford considers the yaws as being in every instance the consequence of contagion, and as depending on a matter *sui generis*. He considers no peculiar predisposition from diet, colour, or other circumstances, as being in any degree necessary. He views the disease as chiefly arising from contact with the matter, in consequence of sleeping in the same bed, washing in the same vessel with the infected, or the like. In short, the yaws may be communicated by any kind of contact; nay, it is even believed that flies often convey the infection, when, after having gorged themselves with the virulent matter by sucking the ulcers of those who are diseased, they make punctures in the skin of such as are sound, and thus inoculate them; in consequence of which the disorder will soon appear, provided the *morbific disposition* of the body be present.

The yaws are not considered as dangerous, if the cure be skillfully managed at a proper time; but if the patient has been prematurely salivated, or has taken any quantity of mercury, and his skin been suddenly cleared thereby, the cure will be very difficult, if not impracticable.

In attempting the cure of this extraordinary disease, the four following indications are chiefly to be held in view:

1. To support the strength of the patient.
2. To promote excretion by the skin.
3. To correct the vitiated fluids.
4. To remove and counteract the injuries done either to the constitution in general, or to particular parts by the disease.

With the first of these intentions, a liberal diet, consisting of a

considerable quantity of animal food, with a considerable proportion of wine, and gentle exercise, are to be employed: but the cure is principally to be effected by mercurial salivation, after the virulent matter has been completely thrown out to the surface of the body by sudorifics. The following are the particular directions given on this head by the author of the article in the Medical Essays. The yaws being an infectious disease, as soon as they begin to appear on a negro, he must be removed to a house by himself; or, if it is not certain whether the eruption be the yaws or not, shut him up seven days, and look on him again, as the Jews were commanded to do with their lepers, and in that time you may be commonly certain.

As soon as you are convinced that it is the yaws, give a bolus of flowers of sulphur, with camphor and theriaca. Repeat this bolus every night for a fortnight or three weeks, or till the yaws come to the height; that is, when they neither increase in size nor number: then throw your patient into a gentle salivation with calomel given in small doses, without further preparation: five grains repeated once, twice, or thrice a-day, is sufficient, as the patient can bear it. If he spits a quart in twenty-four hours, it is enough. Generally, when the salivation is at its height, all the yaws are covered with a dry scaly crust or scab; which, if numerous, look terribly. These fall off daily in small white scales; and in ten or twelve days leave the skin smooth and clean. Then the calomel may be omitted, and the salivation permitted to go off of itself. A dram of corrosive sublimate dissolved in an ounce of rum or brandy, and the solution daubed on the yaws, will, it is said, in general clear the skin in two days' time.

After the salivation, sweat the patient twice or thrice in a frame or chair with spirits of wine; and give an alterative electuary of æthiops and gum-guaiac. He may likewise use the decoction of guaiacum and sassafras fermented with melasses, for his constant drink, while the electuary is taking, and a week or a fortnight after the electuary is finished.

The master-yaw must be consumed an eighth or a tenth part of an inch below the skin, with

(No. 150.) ℞ Hydrarg. nitrat. rub.

Alumin. ust. sing. 3j.

Misce fiat Pulvis.

To digest the wound;

(No. 151.) ℞ Hydrarg. nitrat. rub. (opt. lævig.) 3j.

Unguent. resinæ flavæ 3j. Misce.

It should be cicatrized with lint pressed out of spirits of wine, with some vitriolated copper in it.

After the yaws are cured, some patients are afflicted with carbuncles in their feet; which sometimes render them incapable of walking, unless with pain. The method of cure is, by bathing and paring, to destroy the cuticle, and then proceed as in the

master-yaw. The gentle escharotics are to be preferred, especially here; and all imaginable care is to be taken to avoid the tendons and periosteum.

To children under six or seven years old, at the proper time of salivating, when the yaws are come to their full growth give a grain or two of calomel in white sugar, once a-day, once in two days, or once in three days, so as only to keep their mouths a little sore till the yaws dry, and, falling off in white scales, leave the skin clean. This succeeds always, but requires a longer time than in adults.

In St. Domingo they salivated by unction: but it does not appear that success always followed this practice. It is also usual in that island to give the solution of corrosive sublimate along with a decoction of sarsaparilla. Twelve ounces of this root, and twelve pounds of the coarsest sugar, macerated for fifteen days in twelve quarts of water, is mentioned as a specific, and said to be the prescription of an English physician; the dose is four ounces every sixth hour.

SECT. VIII. *Of the PLICA POLONICA, or PLAITED HAIR DISEASE.*

We spoke concisely of this singular disease under MEDICINE (vol. II. p. 510). Mr. Coxe, who gives a short account of it, attempts likewise to give the physical causes of it. Many causes of this kind, he tells us, have been supposed to concur in rendering the plica more frequent in those regions than in other parts. It would be an endless work to enumerate the various conjectures with which each person has supported his favourite hypothesis. The most probable are those assigned by Dr. Vicat: the first cause is the nature of the Polish air, which is rendered insalubrious by numerous woods and morasses, and occasionally derives an uncommon keenness even in the midst of summer from the position of the Carpathian mountains; for the southern and south-easterly winds, which usually convey warmth in other regions, are in this chilled in their passage over their snowy summits. The second is unwholesome water; for, although Poland is not deficient in good springs, yet the common people usually drink that which is nearest at hand, taken indiscriminately from rivers, lakes, and even stagnant pools. The third cause is the gross inattention of the natives to cleanliness; for experience shews, that those who are not negligent in their persons and habitations, are less liable to be afflicted with the plica than others who are deficient in that particular. Thus, persons of higher rank are less subject to this disorder than those of inferior stations; the inhabitants of large towns, than those of small villages; the free peasants, than those of an absolute state of vassalage; the natives of Poland Proper, than those of Lithuania, Whatever we may determine as to the possibility that all or any of

these causes, by themselves, or in conjunction with others, originally produced the disorder; we may venture to assert, that they all, and particularly the last, assist its propagation, inflame its symptoms, and protract its cure. In a word, the *plica polonica* appears to be a contagious distemper; which, like the leprosy, still prevails among a people ignorant in medicine, and inattentive to check its progress, but is rarely known in those countries where proper precautions are taken to prevent its spreading.

CHAP. XXXVII. OF DISTORTIONS AND CONTRACTIONS.

THESE complaints require a particular management, according to the causes which may have produced them. In the greater number of instances they are rather to be considered as the consequences of disease than as original affections. We shall treat of them under distinct heads for that reason.

SECT. I. Of DISTORTIONS.

Distortions of the bones may arise from external injuries, from diseased constitutions, from a morbid state of the bones, or a contracted state of the muscles, or both; but the affection is most frequently owing to a weakly, delicate constitution, as in rickety or scrophulous cases. As infancy is the period when distortions most frequently take place, and that indeed when the remedy is to be applied with the greatest success, we shall here treat the subject somewhat briefly; reserving for our chapter on *the DISEASES of CHILDREN* some important observations on the mechanical assistance of which these cases admit, from the pen of Mr. Sheldrake.

In the treatment of distortions of the spine, particular attention ought to be paid to the cause of the disorder. If it appear to rise from the patient continuing too long in any particular posture, every habit of this kind should be guarded against on the first appearance of the disease. If the patient has turned too much to one side, the reverse of this should be advised. He ought to sleep upon a firm hair mattress, that his body may lie upon an equal surface. He should use an invigorating diet, the cold bath, bark, and other tonics. By a strict attention to the use of these remedies, the disease has sometimes been retarded in its progress. Various machines have been invented for removing distortions of the spine by pressure; but considerable caution is here required, otherwise much injury may arise from it. Some advantage, however, in certain cases, has been derived from the use of the common collar (Plate III. fig. 90); but the stays and machinery adapted to them (fig. 91), invented in France, and afterwards brought into use in this country by Mr. Jones of London, are found to be still better suited to this purpose.

The same causes which produce distortions of the spine, may likewise produce distortions of the limbs. Sometimes the distortion takes place with the original formation of the bones, at other times it occurs in infancy, and now and then at a more advanced period of life. In early infancy the bones are so pliable as to be readily affected by the postures of the body. When a child is too soon allowed to attempt to walk, its legs are apt to become crooked from their inability to support the weight of the body. Certain diseases likewise, especially rickets, soften the bones so much, that they yield to the posture of the body, and to the common action of their muscles.

When the distortion of a limb is owing to a curvature in a bone, if the case be recent, and especially if it occur in childhood, it may frequently be removed, without much difficulty, by making a gradual but constant pressure, by the use of machinery, on the convex side of the limb, till it recover its natural appearance. When the deformity occurs in the leg, a method has been used, in several instances, which is to fix a firm splint of iron, lined with leather, in the shoe, on the concave side of the leg, the other end of the splint to rest against the under end of the thigh: when, if a broad strap or two be applied round the leg and splint, an easy gradual pressure may be made, and considerable advantage derived from it. See fig. 92.

Along with the curvature above mentioned, it commonly happens that the feet and ankles are affected. When the bones of the legs are bent outward, the fore part of the foot is turned inward, and the inner edge upwards; and the reverse, if the leg be bent inward. In these cases the affections of the feet are generally owing to the curvature of the bones of the leg. By removing the curvature of these, the foot will commonly regain its natural situation, and the splint above mentioned will for the most part be sufficient for the purpose. But in cases where the sole of the foot is turned much out of its natural direction, it may be necessary to fix the splint and shoe to a frame (fig. 93), which will render the cure still more effectual.

Besides the instrument already mentioned, some have used a kind of boot, cut lengthwise, made of hardened leather or of metal, &c. which may in some cases sufficiently answer the purpose.

In cases of club-foot, where the distortion is in the middle of the foot, a pair of shoes, such as are represented by fig. 94. have been found useful. After the feet are fixed in the shoes, the fore part of the feet may be separated by means of a screw in two plates, which are fixed to the sole.

To this account of the treatment of distortions we annex the following remarks by Mr. Sheldrake:

"Distorted spine," says Mr. S., "when it takes place in adults, is the consequence of deranged muscular action, of local disease,

or of general debility; this may either be the only disease, or it may act in conjunction with either of the former in producing the deformity.

“ Under the first head should be included most of those distortions which are so frequent among female children of the middling and upper ranks of life, as well as among various manufacturers and persons confined to such labour as obliges them to keep themselves much in peculiar postures; for it is certain that, whatever may be the motive that induces various persons to habituate themselves to peculiar habits or attitudes, the effect will be the same; the equality of action to which all parts of the body are adapted, and which is essential to the preservation of this form, will be impeded; unequal action will be produced, and in proportion as the parts accustom themselves to this unequal action, their capacity for the natural action diminishes till it is totally lost; a peculiarity of form begins, and terminates in actual deformity, which continually increases, unless all the practices which occasioned it are laid aside, and proper methods adopted to obviate the deformity that has already been produced.

“ Distorted spine from this cause is so frequent among children, that it is very generally said that none but children can be afflicted with it, or, in other words, that when people are grown up their bones become fixed, and they are not liable to become deformed; it is said, too, that when persons so deformed have arrived at maturity, their bones are so fixed that they are incapable of alteration, and, of course, the deformity cannot be removed. Neither of these opinions are true; for it is most certain, that if a person not accustomed to it by education and habit was put to any laborious employment, he would acquire the peculiarity of form that is common to those who follow the same employ; if he persevered in that employment to a greater degree than his strength would enable him to support, that peculiarity of form which is so produced, would, by the operation of debility occasioned by excessive action, degenerate into positive deformity; and it is the fairest induction to say, where there is such a state of parts as will permit a well-formed body to degenerate into a state of deformity, the same state of parts will allow the deformed body to return to its natural form, provided that adequate means can be employed and followed with a due degree of perseverance till the desired effect is produced. If due attention were paid to these facts, many cases of lamentable deformity would be prevented, and many more would be cured that are now abandoned as irremediable.

“ The disease which most frequently produces distortions of the spine and consequent deformity is, that caries of the vertebræ which is generally attended with paralysis of the lower extremities. As it is certain that the stability of our form, and much of our capacity to maintain the erect position, is the consequence of the

form and substance of the spine, it is equally evident, that any loss of substance in the spine must weaken it in the direction of the part from which that substance is removed; the body will, of course, sink in that direction. The muscles, which are enabled to perform their natural functions in consequence of their connection with the spine in its natural state, become deranged in their action in consequence of the altered state of the spine; the parts above act upon it by the effect of gravity, the deranged action of the muscles brings that gravity into action with accelerated force; and general deformity is the inevitable consequence, unless effectual measures are taken to prevent it. But this is not all: the disease itself is increased, all the functions of life are impeded, and too frequently those patients sink irrecoverably under this disease, or if they do not, only partially recover, and pass the rest of their lives in a state very little removed from that of continual illness.

“ Mr. Pott, to whom the medical world usually attribute the only successful method of curing this disease *, having previously seen it treated as common curvature of the spine, with such machinery as was used in the practice of that time, and always without success, contracted a violent prejudice against all mechanical assistance; but now that further experience has enabled us to judge with more accuracy on the subject, there can be no doubt, that in almost every case of this kind, the most essential benefit may be derived from judicious mechanical assistance.

“ What are the facts of the disease? Caries; that is, ulceration in the bodies of the vertebræ, preceded and accompanied by inflammation in the parts immediately connected with them, is going on. This weakens the spine, and produces pressure from the parts above upon it, and consequent irritation in the diseased parts, and aggravates all the symptoms of the disease: it is evident that this is the case, because, according to the best surgical treatment of the disease, the patient is kept in bed during the cure, that the diseased parts may be absolutely at rest.

“ The success of this practice affords the strongest proofs that can be given of the mischief that will be produced by the pressure of those parts which are situated above the disease; and if the patient is confined to his bed merely to avoid the consequences of that pressure, it may be fairly questioned whether the cure would not be further promoted by the use of such mechanical contrivances as will obviate the effects of that pressure, and leave the patient at liberty to receive all the additional benefit that he may derive from air, exercise, &c. Without attempting to discuss this question, however, it is proper to suggest another that is equally important.

* Mr. Pott's name is generally affixed to this method of treating the disease, though he himself acknowledges that he received the idea of this method from Dr. Cameron, of Worcester; who adopted it from Hippocrates.

“ When the disease is eradicated, those parts of the spine that have been separated by the loss of substance must be re-united. This must be effected, either by suffering the divided parts to come in contact with each other, or by keeping them separate, till so much callus is formed as will supply the deficiency. In the former case, if the patient has been kept in bed, deformity has been prevented during the cure, but must come on afterwards, and will be proportioned to the quantity of substance that has been lost, for the body will sink till the parts that have been separated come into contact with each other; and if the loss of substance has been great, the deformity must be considerable; and by this circumstance alone the patient's health may be materially affected. - If it is determined to keep the parts suspended till the deficiency is supplied by the formation of callus, mechanical assistance must be procured; and as, upon a candid revival of all the circumstances of this disease, it appears that, in every case, deformity must come on, unless prevented by mechanical means, it may be suggested as a general rule to apply such instruments as will most effectually support the patient; which will not only prevent that deformity, but diminish the violence of those symptoms which would have been consequent to it, and have aggravated the disease.

“ When distorted spine makes its appearance in consequence of mere debility, it requires to be treated in the same manner so far as relates to mechanical assistance, i. e. the whole body should be so supported that it cannot bend in any improper direction. If a patient so situated does not recover his natural strength, no additional deformity will be produced; that which has taken place will be removed, and by the same means that were used to remove it, the patient may be supported for any length of time; but if he does regain strength, his figure will be restored, and there will be no need of artificial support.”

Various means have been proposed to effect this; we here add the description of that invented by Mr. Sheldrake, and which he says he has long used with success.

“ The lower part of this instrument (see Pl. V.), which is the basis of the whole, is a circle of steel made to fit the shape exactly, and go round the body, rather below the hips, and fasten before: on each side is a cavity made to fit each of the hips exactly: on the back of this is to be fixed a plate of steel, nearly as broad as the back itself, and quite as high as the shoulders; and in whatever part the curvature of the spine may lie, so much of the back must be cut away as will prevent any pressure from being made on the diseased part. On that part of the back which is next the shoulders two straps should be fixed, to go round the shoulders like the straps of the common collar.

“ To this back should be fixed an upright piece of steel, which

extends to the head, and passes round the back of the head, nearly as far as the temples: this should be guarded so as to prevent its pressure from hurting the head; it may be fastened on the head either by a band round the forehead, or a strap fastened under the chin: we should be directed by circumstances in choosing which of these modes should be adopted.

"There are cases in which it will be desirable to carry the steel part *over* the head, like Le Vacher's machine, instead of under the occiput, as it is here directed; it has therefore been thought right to exemplify both methods in the engraved figures: Fig. 1, represents a back view of the instrument, with the support under the occiput, and fig. 2, a profile view of the same instrument, with the support passing over the head.

"It is evident that this instrument will answer every purpose that can be derived either for support or extension. If that part which rests upon the pelvis is properly adapted, it forms the firmest basis for the whole to rest upon. The head is, at the same time, well secured in the upper part, and thus effectually supported; at the same time, that it may be gradually raised so as to take off the weight, or to produce any degree of extension the situation of the patient can admit of; at the same time that the body is left at perfect liberty, and respiration is not impeded, as it must be by those contrivances that are fixed on stays of any kind."

The instrument represented is of the simplest form, as it perfectly explains the principle, but it is necessary to add, that it is possible to adapt them so exactly to the circumstances of individual cases, that they shall even constitute a part of the dress, sometimes be concealed by it so effectually as to give the deformed person the appearance of a good shape, and thus act as a means of concealing the defect from the most intimate acquaintance, while at the same time the cure is going on.

SECT. II. Of CONTRACTIONS of the LIMBS, &c.

Contraction, called also by Dr. Aitkin, *beriberia*, is an immobility of any of the joints, induced by a preternatural contraction of some of the muscles destined in a natural state to move them; or from some derangement of the osseous or ligamentous parts about the joint affected.

Cullen ranks this as a genus of disease in the class Locales, and order Dyscinesæ, and defines it "a continued, rigid contraction, of one or more of the limbs." He distinguishes two species. 1. *CONTRACTURA PRIMARIA*, from a rigid contraction of muscles, termed also *obslipatis*: which word, with any other annexed, is only one or other variety of contracting: an instance is that known by the name of WRY-NECK, called *torticollis*. Of this species he forms

four varieties. 1st. When the muscles become rigid from inflammation. 2d. From spasm. 3d. When contracted from the antagonists being paralytic. 4th. From irritating acrimony. 2. CONTRACTURA ARTICULARIS, from rigid joints. These last are more particularly to be considered here.

Mr. Gooch mentions a case in which he cured a contraction of the neck without any operation. This, however, did not happen in consequence of any natural defect of the constitution, but was occasioned by a fall from an horse, in a young woman. When brought to him, long after the accident, her chin was fallen upon her breast, and from the friction by an involuntary and constant vibrating motion, the skin was fretted off both these parts; which, with the pain she suffered upon the posterior part of her neck, made her life very uncomfortable. Various applications and bandages had been tried for two years to no purpose. He gave directions for making the machine represented in Pl. IV. fig. 86, by the use of which alone the relaxed parts recovered their tone and action, and she was perfectly cured in six months. By the same contrivance he afterwards cured a similar case of a year's standing, except that the oscillation of the head was not quite so much.

Dr. Aitkin observes, that joint contraction (as he terms the other kind) is most frequently symptomatic: and when it depends on muscular contraction only, he advises the tepid bath, and deligation, and counteraction by weights, hung in due proportion, to oppose the contraction. Certain it is, that mechanical force, assisted by vapour baths, and topical relaxants, has gradually succeeded in restoring contracted limbs to their proper position. The operations of Mr. Buzaglio, in this way, are, no doubt, remembered by many; and Mr. Pugh, a practitioner now in London, succeeds in the treatment of these cases on similar principles. The most novel and ingenious invention, however, for purposes of this nature, is Mr. Smith's *air-pump vapour-bath*, a view of which we have given in Plate V. The following accounts of it, and of the different purposes to which it seems to be applicable, are given in the Medical and Physical Journal, No. XXXVIII. by Dr. Hamilton and Mr. Blegborough:

"As the machine," says Mr. Blegborough, "comprehends, and, for the first time, combines the application of *fomentation* and the *cupping-glass*, two of the most powerful external means of acting on disease, and that more extensively than ever was before thought of; what effects may we not be led to expect from so extended a combination? Every day's experience is proving to us the efficacy of the application in gout, rheumatism, *contractions of muscles*, cutaneous and other diseases, particularly of the chronic kind; and though its application has not yet been so extensive, under my own immediate inspection, as to warrant my affirming it to the extent,

I hope to be soon able to do; nevertheless I have reason to believe, from some recent cases, that acute diseases also are not beyond the reach of its influence, and that from its power in promoting a copious diaphoresis and relaxation of the whole system, it may be made to produce the happiest effects in phrenitis, pleuritis, enteritis, &c.

"The peculiar construction of the machine before us is adapted to the leg or arm only, but the principle extends much further, and can be applied to any part of the body by the intervention of glasses, or otherwise. One is already made that includes one half of the body; and when we consider that by its means the pressure of the atmosphere can be removed from so large a surface, every square inch of which sustains a weight of 15lb. the effects on the vessels circulating the fluids in such parts are too evident to need insisting on in this paper. One very obvious one is, that the consequent temporary expansion of them from so great a pressure being removed, must give an opportunity for obstructions formed in them to give way, at the same time arresting the progress of inflammation, the means which Nature, left to herself, is under the necessity of employing to bring about the same end. In this manner is avoided a great deal of misery arising from symptomatic fever, &c. and not unfrequently destruction of parts, the consequence of suppuration."

Dr. Hamilton, physician to the London Dispensary, who accidentally saw the effects produced by its application, speaks of it, in a letter to Mr. Smith, of Brighton, the inventor, in the following terms:

"The mode in which it must act is agreeable to sound theory, and the more it is put in practice, the oftener will facts occur to confirm what I now say. I not only view it as valuable to remove local affections of the extremities, but also to afford relief in other parts of the body, where obstructions may have taken place. There are some complaints which would often be greatly mitigated, if not always removed, by its power in producing a general and copious sweat over the whole frame, such as in the diabetes, dropsy, and other maladies where the skin is parched, dry, and hard. In general, it will be well to pump out the air gradually, and to see the effects of a partial exhaustion of the machine; for its being done too suddenly, will allow the air in the circulating fluids to exert its spring with too great force, producing acute pain, &c."

Though this is the first drawing that has been made of it, or the first time any thing has appeared concerning it in print, yet the credit of it is by no means to establish. "It is too well founded in philosophy," says Mr. Blegborough, "not to have attracted the attention of medical men, some of whom, high in their profession, have not only recommended it to their patients, but have had it applied to their own persons with the most marked benefit. Many

valuable cases are already in my possession, some of them of persons of the first consideration in the kingdom; but as it is my intention to publish an account of them, I shall content myself at present with simply stating its principles, and leave it with professional readers to draw their own conclusions." We certainly so far agree with the gentlemen who have thus introduced this promising invention into notice, as to consider it well worth the attention of the medical practitioners. The following explanation of the figure of this machine will make its operations better understood.

Fig. 1. A view of that end of the machine to which the exhauster, &c. are fixed. (A) the body of the machine. (B) the boiler, containing the fluid, the fumes of which are thrown into the machine through the stop-cock (H), and heated by means of (C) a spirit lamp. (D) the valve in the boiler for the escape of the fumes when prevented entering into the machine by turning the stop-cock (H). (E) a thermometer, shewing the temperature of the fumigation. (F) the exhauster; for exhausting the machine after the fumigation has continued a proper time, 40 strokes of which are as many as any person can bear at once. (G) the escape valve of the exhauster; to which a flexible pipe is adapted to convey the air from the chamber, if vitiated by the nature of the affection for which the application is made. (H) the stop-cock. (I) another, to prevent the valves of the exhauster from being injured by the hot fumes as they enter the machine during the fumigation.

Mr. Smith, of Brighton, claims the merit of its invention, and has, by occasional alterations, in the space of some years, brought it to its present state of simplicity and perfection. The idea of sucking poison from wounds first led him to believe that mechanical means might be employed on the same principle to a great extent. How far the intention is answered by the air-pump vapour-bath, and how extensive the application of it may be made in the treatment of disease, the public are to be the judges.

Whether the object of the present section will be promoted by the operation of the air-pump in conjunction with the relaxing effects of warm vapour applied to contracted limbs, remains to be determined by the gentlemen who have made trial of the machine.

SECT. III. Of SQUINTING.

Squinting is a well-known deformity, arising, in most cases, from a preternatural contraction of one or more of the muscles of the eye. By this means, the axis of the pupil is drawn towards the nose, temples, forehead, or cheeks, so that the person cannot behold an object directly.

1. This disease may proceed from custom and habit; while in

the eye itself, or in its muscles, nothing is preternatural or defective.

Thus children, by imitating those that squint, and infants, by having many agreeable objects presented to them at once, which invite them to turn one eye to the one and the other eye to another, do frequently contract a habit of moving their eyes differently, which afterwards they cannot so easily correct. Infants likewise get a custom of squinting by being placed obliquely towards a candle, window, or any other agreeable object capable of attracting their sight: for though, to see the object, they may at first turn both eyes towards it; yet, because such an oblique situation is painful and laborious, especially to the most distant eye, they soon relax one of the eyes, and content themselves with examining it with the eye that is next it, whence arises a diversity of situation, and a habit of moving the eyes differently.

In this case, which may admit of a cure, if not too much confirmed, it is evident, that objects will be seen in the same place by both eyes, and therefore must appear single as to other men; but because in the eye that squints, the image of the object to which the other eye is directed falls not on the most sensible and delicate part of the retina, which is naturally in the axis of the eye, it is easy to see that it must be but faintly perceived by this eye. Hence it is, that while they are attentive in viewing any object, if the hand be brought before the eye, this object will be but obscurely seen, till the eye change its situation, and have its axis directed towards it; which change of situation is indeed very easy for them, because it depends on the muscles of the eyes, whose functions are entire; but, by reason of the habit they have contracted of moving their eyes differently, the other eye is, at the same time, frequently turned aside, so that only one at a time is directed to the object.

That all this may be the better perceived, for an object, cause them to look at the image of the upper part of your nose in a plane mirror, while you stand directly behind them, to observe the direction of their eyes.

2. The *strabismus* may proceed from a fault in the first conformation, by which the most delicate and sensible part of the retina is removed from its natural situation, which is directly opposite to the pupil, and is placed a little to one side of the axis of the eye; which obliges them to turn away the eye from the object they would view, that its picture may fall on this most sensible part of the organ.

Whenever this is the case, the disease is altogether incurable, and the phenomena that arise therefrom differ in nothing from the phenomena of the former case, excepting only that here, 1. The object to which the eye is not directed will be best seen; which is the reverse of what happens when the disease arises barely

from habit or custom. 2. No object will appear altogether clear and distinct; for all objects to which the eye is directed, by having their image painted in the retina at the axis of the eye, where it is not very sensible, will be but obscurely seen; and objects that are placed so far to one side of the optic axis as is necessary for making their image to fall on the most sensible and delicate part of the retina, must appear a little confused, because the several pencils of rays that come therefrom fall too obliquely on the crystalline to be accurately collected in so many distinct points of the retina: though it must be acknowledged, that this confusion will, for the most part, be so small as to escape unobserved.

3. This disease may proceed from an oblique position of the crystalline, where the rays that come directly to the eye from an object, and that ought to converge to the point of the retina, which is in the axis of the eye, are, by reason of the obliquity of the crystalline, made to converge to another point on that side of the visual axis where the crystalline is most elevated; and, therefore, the object is but obscurely seen, because its image falls not on the retina at the axis of the eye, where it is most sensible: but the rays that fall obliquely on the eye, will, after refraction, converge to this most sensible part of the retina; and, by converging there, must impress the mind with a clearer idea of the object from whence they came. It is for this reason that the eye never moves uniformly with the other, but turns away from the object it would view, being attentive to the object to which it is not directed. When this is the case, it is in vain to expect any good from surgery.

The symptoms that naturally arise from it are, 1. The object to which the eye is directed will be but faintly seen, because its image falls on the retina where it is not very sensible. 2. The object to which the eye is not directed, by having its image painted on the retina at the axis of the eye, will be clearly perceived. But, 3. This same object must appear somewhat indistinct, because the pencils of rays that flow from it are not accurately collected in so many distinct points in the retina, by reason of their oblique incidence on the crystalline. 4. It must be seen, not in its proper place, but thence translated to some other place situated in the axis of vision. And, 5. being thus translated from its true place, where it is seen by the other eye that does not squint, it must necessarily appear double; and the distance between the places of its appearance will be still greater, if the crystalline of the other eye incline to the contrary side.

4. This disease may arise from an oblique position of the cornea; which in this case is generally more arched and prominent than what it is naturally.

When the eye has this conformation, no object to which it is directed can be clearly seen, because its image falls not on the

retina at the axis of the eye; and, therefore, the eye turns aside from the object it would view, that its image may fall on the most sensible part of the retina.

When the strabismus proceeds from this cause, the prognostic and the phenomena that attend it will be much the same as in the case immediately preceding; from which nevertheless it may be distinguished by the obliquity of the cornea, which is manifest to the senses; and if the cornea be also more arched and prominent than what it is naturally, which is commonly the case, the eye will also be short-sighted.

5. This want of uniformity in the motion of our eyes, may arise from a defect, or any great weakness or imperfection, in the sight of both or either of the eyes; and this, according to Dr. Porterfield, is the most common cause of this disease. The prognostic in this case is the same with that of the disease from which it proceeds.

6. Another cause from which the strabismus may proceed, lies in the muscles that move the eye. When any of those muscles are too short or too long, too tense or too lax, or are seized with a spasm or paralysis, their equilibrium will be destroyed, and the eye will be turned towards or from that side where the muscles are faulty.

In this case the disease frequently yields to medicine, and therefore admits of a favourable prognostic; excepting only when, by a fault in the first conformation, any of the muscles are longer or shorter than their antagonists; in which case, if ever it should happen, no medicine can be of any use.

As to what concerns the optical phenomena, they are the same here as in case first: only when the disease commences not till, by custom and habit, the uniform motion of the eyes has been rendered necessary, all objects do for some time appear double; but in time they appear single.

7. This want of uniformity in the motions of our eyes may proceed from a preternatural adhesion or attachment to the eyelids: of this we have an instance in Languis. And that the same thing may also be occasioned by a tumor of any kind within the orbit, pressing the eye aside, and restraining it from following the motions of the other, is so evident, that instances need not be brought to prove it. Here also the case may admit of a favourable prognostic; and as for what concerns the optical phenomena, they must be the same as in the case immediately preceding.

In confirmed cases, the cure is to be effected by mechanical contrivances, by which the person may be obliged to look straight upon objects, or not see them at all; or at least that he may see with uneasiness and confusedly when he squints. In the 68th volume of the Philosophical Transactions we have an account of a confirmed case of squinting of a very uncommon kind. The pa-

tient was a boy of five years old, and viewed every object which was presented to him with but one eye at a time. If the object was presented on his right side, he viewed it with his left eye; and if it was presented on his left side, he viewed it with his right eye. He turned the pupil of that eye which was on the same side with the object in such a direction, that the image of the object might fall on that part of the bottom of the eye where the optic nerve enters it. When an object was held directly before him, he turned his head a little to one side, and observed it with but one eye, viz. that most distant from the object, turning away the other in the manner above described; and when he became tired of observing it with that eye, he turned his head the contrary way, and observed it with the other eye alone, with equal facility; but never turned the axes of both eyes on it at the same time. He saw letters which were written on bits of paper, so as to name them with equal ease, and at equal distances, with one eye as with the other. There was no perceptible difference in the diameters of the irises, nor in the contractility of them after having covered his eyes from the light. These observations were carefully made by writing single letters on shreds of paper, and laying wagers with the child that he could not read them when they were presented at certain distances and in certain directions.

As from these circumstances it appeared that there was no defect in either eye, which is frequently the case with persons who squint, and hence that the disease was simply a depraved habit of moving his eyes, the disease seemed capable of a cure. A paper gnomon was made for this purpose, and fixed to a cap; and when this artificial nose was placed over his real nose so as to project an inch between his eyes, the child, rather than turn his head so far to look at oblique objects, immediately began to view them with that eye which was next to them. But having the misfortune to lose his father soon after this method was begun to be followed, the child was neglected for six years, during which time the habit was confirmed in such a manner as seemed to leave little room to hope for a cure. The same physician, however, being again called, attempted a second time to remove the deformity by a similar contrivance. A gnomon of thin brass was made to stand over his nose, with a half circle of the same metal to go round his temples: these were covered with black silk, and by means of a buckle behind his head, and a cross-piece over the crown of his head, this gnomon was worn without any inconvenience, and projected before his nose about two inches and a half. By the use of this machine he soon found it less inconvenient to view all oblique objects with the eye next to them instead of the eye opposite to them.

After this habit was weakened by a week's use of the gnomon, two bits of wood, about the size of a goose-quill, were blackened all but a quarter of an inch at their summits; these were fre-

quently presented to him to look at, one being held on one side the extremity of his black gnomon, and the other on the other side of it. As he viewed these, they were gradually brought forwards beyond the gnomon, and then one was concealed behind the other : by these means, in another week, he could bend both his eyes on the same object for half a minute together ; and by continuing the use of the same machine, he was in a fair way of being cured when the paper was written.

Dr. Darwin, who writes the history of the above case, adds, that all the other squinting people he had occasion to attend, had one eye much less perfect than the other : these patients, says he, are certainly curable by covering the best eye many hours in a day, as by a more frequent use of the weak eye, it not only acquires a habit of turning to the objects which the patient wishes to see, but gains at the same time a more distinct vision ; and the better eye seems to lose somewhat in both these respects, which also facilitates the cure.

Those who have occasion to treat cases of strabismus will do well to consult the curious papers of Mr. Home, on the means by which the pupil of the eye adapts itself to nearer or more remote objects, in the Philosophical Transactions for 1800.

CHAP. XXXVIII. OF DIMINISHING PAIN IN SURGICAL OPERATIONS.

THE pain induced by surgical operations may be lessened in two different ways. The first is, by diminishing the natural sensibility of the system ; and for this purpose narcotics of different kinds, and particularly opium, have been used ; but these are apt to induce disagreeable symptoms, especially sickness and vomiting, which might be attended with bad consequences after some operations. They are therefore seldom employed before an operation. When, however, they are given immediately after it, and repeated as circumstances may require, they often give great relief.

The other method of diminishing pain is, by lessening the sensibility of a particular part of the body. It has long been known, that the sensibility of any part may not only be lessened, but entirely suspended, by compressing the nerves which supply it. From a knowledge of this circumstance, an instrument (fig. 101) was invented some years ago by Mr. James Moore of London, by which the principal nerves of a member might be so compressed as to render the parts below perfectly insensible. A difficulty, however, arises here ; for as the nerves must be compressed at least an hour previous to the operation, in order to render the parts quite insensible, and as it is extremely difficult to compress the nerves without at the same time affecting the veins, the latter are therefore

in danger of being burst. To prevent this inconvenience, Mr. Moore proposes to open a vein; but this might be attended with bad consequences in weakly constitutions. Besides, it is said, that by compressing the nerves in this manner, although less pain may be felt in the time of the operation, it is proportionally greater after the compression is removed. In certain parts of the body, however, where sufficient compression can be made upon the nerves without acting much upon the veins, it would appear that this method may be practised with advantage; though it has not yet been done, except in a very few instances.

CHAP. XXXIX. OF BANDAGES.

THE proper application of bandages is an object of great importance in surgery: and though dexterity is only to be acquired in this branch by practice, yet a few general rules may be found useful. Bandages are employed for the retention of dressings, for stopping hæmorrhages, for removing deformities, and for effecting the union of divided parts. They ought to be formed of such materials as are sufficiently firm, while, at the same time, they give no uneasiness to the parts to which they are applied. They may be composed either of linen, cotton, or flannel. Of late years the two last have been preferred by many for their warmth and elasticity, on which account they are certainly most proper, especially in winter; and likewise in cases where the parts are liable to swelling and inflammation, as in wounds, luxations, and fractures. Besides, they more readily absorb any moisture which may be discharged from the sores.

When first applied, they should be clean, sufficiently strong, and as free of seams as possible. They should be so tightly applied as to answer the purpose for which they are intended, without being in danger of impeding the circulation. They should be applied in such a manner that they may be easily loosened, and the parts examined with as much accuracy as possible; and they should be laid aside as soon as the purpose for which they are intended is accomplished; for when longer continued, they frequently impede the growth of the parts upon which they are applied.

With respect to bandages for particular parts, we shall begin with the head, and then proceed to the trunk and extremities. The *couvre chef* of the French, which is a square napkin folded cornerwise, is most frequently used where the bandage is wanted for the head; but a nightcap, having a band to go round the head, and another to tie under the chin, appears to be more suitable for this purpose. For making compression on any particular part of the head, as for stopping of bleeding vessels, the radiated bandage may be employed.

For keeping the edges of wounds together, as in cases of longitudinal cuts of the head, or of any other parts, the uniting bandage is usually employed, and is always to be preferred to future, where it retains the edges of the wound with sufficient exactness. To retain dressings upon the eyes, several turns of a roller have been used, and it is termed *monoculus* or *binoculus*, according to its being applied to one or both eyes: but the *couvre chef*, and the nightcap already mentioned, are less apt to slip, and therefore found more convenient for this purpose.

For fractures of *the nose*, or wounds there, or on any other part of the face, the uniting bandage answers best. And in cases of fracture of the lower jaw, a four-headed roller is most convenient: the hole in the centre of the roller receives the chin, and assists in preventing the bandage from shifting. The two upper heads are to be carried backwards; and being made to pass each other at the occiput, they are afterwards brought once or twice round the head. The two under heads of the roller being reflected over the chin, are then to be turned upwards and fixed on the upper part of the head.

The bandages necessary for *the neck* are, the machine already mentioned after the operation of bronchotomy, and one used in cases of wry neck. For every other purpose of bandaging, a common roller may answer perfectly well.

For fractures of the scapula, the application of a long roller may be of service.

For retaining dressings upon *the thorax*, the napkin and scapulary are commonly, and very properly, used; and when the napkin is employed merely for retaining dressings, it need not be longer than to pass once round the body; but if it be used for making pressure over a fractured rib, it ought to pass two or three times round. For both purposes its breadth ought to be three or four inches for an adult.

The same kind of bandage is also used for making pressure on the abdomen, as in cases of umbilical or ventral hernia; and to keep the bandage properly placed, a scapulary is used for preventing it from slipping down, and one or two straps connected with it behind, are brought between the thighs, and fixed to it before, to prevent it from moving up. A bandage of flannel, and different kinds of belts, are contrived for compressing *the abdomen* in the operation of tapping; and trusses of various constructions are used for the retention of the protruded bowels in cases of hernia.

Bandages of cotton or flannel are used for supporting *the scrotum* in the various diseases which may occur there, as well as after the operations performed upon it.

One of the best bandages for *the penis* is a linen or cotton bag, fixed by a roller round the body.

For retaining dressings about *the anus*, or between that part and

the scrotum, the T bandage is commonly used; and it is made either with one or two tails, according to the situation of the part to which it is to be applied.

In simple fractures, and most other diseases of the arm, forearm, and hand, the roller is the bandage commonly used; but in compound fractures of these parts, as well as in the different kinds of fractures of the lower extremities, the twelve or eighteen tailed bandage is necessary.

For longitudinal wounds of the extremities, the uniting bandage is used with the same advantage as has been already mentioned for wounds of a similar nature upon the head.

CHAP. XL. ON DISSECTION.

SECT. I. *Of the* OBJECTS *to be attended to in* DISSECTIONS.

WE have, in enumerating the several *qualifications requisite to make a good surgeon* (see vol. III. p. xxxix), dwelt on the importance of his availing himself of every opportunity that offers, of dissecting, and of opening dead bodies with a view to become acquainted with their diseases. We shall here present the reader with the sentiments of Mr. C. Bell, a late writer on the subject, which will serve to direct the judgment in this pursuit. He says,

“From what I have seen of private dissection, I would rather advise those who are desirous of undertaking a complete course of dissections, not to begin their labours with learning all the muscles of the body; for this, besides other disagreeable circumstances, is a dry and tedious task at first.—It will perhaps be found more truly useful to begin their dissections with general views to the economy of such parts as, from lectures or books, they know to be of importance; then proceeding, in a more determined way, to study rigidly the anatomy of the bones and muscles, and accidents of the great joints,—the blood-vessels and nerves, and the anatomy of the great operations of surgery.

“During dissection, there are many little operations which should be practised, and which are neglected. The introducing, for example, of probes into the ducts; as into the nasal duct, and into the ducts of the salivary glands: the introducing of instruments into the nose and throat, and into the Eustachian tube: the use of the probang, and of the catheter, &c.—Knowledge and dexterity in such points often prove more useful, as being oftener required, than the greater operations of surgery.”

After a nice description of the mode of dissecting the abdominal muscles, the *linea alba*, the *linea semilunaris*, &c. the author gives the following judicious directions on hernia, dropsy, and ascites, as connected with the anatomy of these muscles.

“ It is wrong to cut across the belly in opening collections of matter amongst these muscles, unless they have been destroyed by the matter; because the fibres of the muscles are then cut across, hence they retract, and form a gap; and at the same time the possibility is increased of wounding the epigastric artery which runs up the belly. By opening these abscesses with an incision parallel to the fibres of the muscles, the parts are divided, without allowing the muscles to retract; and the chance of wounding the arteries is lessened. In tapping for the dropsy, it is said that the epigastric artery (the course of which I have marked in the plate with a dotted line) is sometimes wounded, or its accompanying vein. But it should be expected, when these were wounded, that while the canula remained in the wound, distending the orifice, they should not bleed. If they should bleed, however, they may probably be stopped by pressing the canula obliquely to one side. I have never seen an accident of this kind; but such cases have been described to me, where the deluge of waters was coagulated in the tub. Perhaps an enlarged spleen, or some of the viscera touched with the trochar, may sometimes account for such a bleeding.”

The author's directions for the mode of opening the abdomen, to investigate the seat of disease, are clear and simple. These are the stages: “ Make a crucial incision, at once laying open the viscera—or, if in a female, make your incision so as to leave a triangular flap to fall over the parts of generation, by continuing your longitudinal cut no further than the umbilicus, and from that point, making an oblique incision on each side, towards the projecting point of the ilium, forming thus three triangular flaps. Then observe whether the parts are in their natural situation: examine the omentum, the stomach, the spleen, the intestines, and then the liver and gall ducts. Then separating the stomach and colon, connected by the omentum, raise the stomach, and examine the pancreas.—Cutting up the adipose membrane, examine the kidneys, by making a section of them. Then following the ureters, examine the contents of the pelvis, &c. In making up your case, first mark the general deviations from the healthy appearance of the viscera; then detail the history of the disease, and take notice of any anomalous appearances which seem unconnected with the principal disease.

“ On this subject (disease of the abdominal viscera) it is of importance to study the nature of inflammation, of adhesions, and suppuration, and the almost uniform consequence of disease upon the peritoneum. It will be easy, when this knowledge is acquired, to unravel the diseased viscera, which, without it, must appear confused and intricate.

“ Active inflammation should be distinguished from turgidity of the vessels; for often a fulness of the veins, mechanically produced, is described as an active inflammation in the brain and in

the pleura, and still oftener in the abdomen. In dropfy, in violent distention of the intestines, in tympanites intestinalis, and after child-bearing, the veins of the intestines and peritoneum are often found distended with blood. But in real inflammation, the peritoneum becomes thickened, pulpy, and less transparent—the blood is also of a brighter red colour; a circumstance which seems not to be owing to a peculiar property in the inflamed part, of preserving the arterial colour of the blood (as Mr. Hunter suggests), but to its more general suffusion.

“As the eye becomes dry and painful and inflamed when the eye-lids are forcibly kept open and prevented from spreading the secretion upon its surface; so, when the enveloping membrane of the viscera is exposed, the natural secretion of its surface is destroyed, and it is irritated and inflamed. Or, by inflammation from any other cause, the secretion is destroyed; the parts lying in contact are no longer kept separate; they mutually affect each other; and, producing a new action, unite.

“Adhesions are produced in the peritoneum and intestines in a wonderfully short time; and the smooth membrane, when it is torn from its new connections, appears cellular; or, upon being cut, thickened, and solid—or if the surface have undergone severe inflammation (without being allowed to form these adhesions, which are so frequently the consequence of inflamed peritoneum), its surface becomes ragged, and numerous floculi of new membranes are formed upon it.

“In diseases where inflammation has spread among the viscera, it is generally understood that the peritoneum is the original seat of the inflammation.—And, according to this view of the subject, it appears upon dissection, that the intestines do more readily than the muscles participate in the inflammation of the peritoneum. The muscles are indeed guarded in some measure by the loose cellular substance, which separates them from the peritoneum. But this does not satisfactorily account for what, in the above view, appears to be so great a difference between the sympathy of the intestines and that of the muscles with the peritoneum. The true explanation seems to be, that the disease or inflammation is in general communicated, not from the peritoneum to the intestines, but from the intestines to the peritoneum.—It is the disease of the intestines which produces those deadly symptoms that are said to mark inflammation of the abdominal cavity; and although there are diseases in which the peritoneum is peculiarly the seat of inflammation, yet the inflammation of the peritoneum, produced by any external cause, is dangerous only by propagating its inflammation to the intestines.”

The author's observations on the *stomach, duodenum, and liver*, are as follow:

“In examining the body,” says he, “it will be observed how

the stomach and spleen may be wounded by a thrust apparently into the thorax; or how the lungs and stomach, or lungs and liver, may be thrust through at once. It may also be observed how the stomach and liver lie before the diaphragm, where it goes obliquely down upon the back part of the abdomen; and how they lie contiguous to one another. The effect of hydrothorax, in pushing down the diaphragm, and depressing these parts—and the effect also of enlargement of the liver, or distension of the stomach upon the breathing, must be obvious. It will also be seen how a hernia of the stomach into the thorax may happen by a rupture of the diaphragm.

“The stomach is commonly retired behind the colon, and under the ribs. Yet when slightly distended, it comes further down in the belly, and assumes the place of the arch of the colon. Therefore finding a patient with an open ulcer immediately under the scrobiculus cordis, discharging the contents of the intestines (an instance of which I have lately seen), it may be questioned whether it be an opening from the stomach or from the colon. This may perhaps be determined by observing the matter discharged, whether it be food partly digested, as from the stomach; or faeces, as from the colon, after having gone through the whole length of the canal.

“Ulceration of the inner coats, and cancerous tumors, of the stomach, are frequent. Upon the inside of the stomach, intestines, and bladder, when violently inflamed by any irritation, there is often a general redness with bloody slime, or there are small blots of florid extravasation. The few cases of cancerous tumors of the stomach which I have seen, accord with the common observation, that the upper orifice of the stomach is more liable to disease (owing to its more glandular structure), and more exposed to injury from substances swallowed. I have seen the whole upper half of the stomach, with its walls so much diseased, that they were not less than one inch in thickness, with their inner surface soft and cancerous. This disease was attended, during the patient's life, with a continual gnawing pain, with soreness even upon taking the softest food, and with extreme pain upon swallowing any thing, in the slightest degree stimulating. In diseases of this kind, and where there are tumors projecting into the stomach, there is frequent vomiting of black chocolate-coloured blood, which is often attended with fainting.

“Contractions of the œsophagus, and upper orifice of the stomach, are frequent without any organic disease. When there is disease of the œsophagus, the stomach is found contracted in breadth, and scarcely to be distinguished from the intestines (HALLER); but it is said, that when the disease is lower down, the stomach is found to be distended. I do not know whether this last observation holds good. The stomach, however, is often

distended so as to fill almost the whole belly, without any other extraordinary appearance. And in these cases, the small intestines being compressed, obstinate costiveness is induced.

“ That the coats of the stomach are affected by its own juices, is now universally believed. But, as far as I have observed, erosion is not in such cases to be expected. Nor are the coats thinner, but they are thickened, gelatinous, yielding, and tender to the fingers; a circumstance that has often troubled me in injecting the vessels of the stomach. That this is produced by the secreted fluid of the stomach, unassimilated with the food, we are assured from the intestines not being thus affected, though in the same circumstances with regard to putrefaction. Although it be a common and well-founded observation, that the stomach is extremely delicate, and although the instances of sudden death occasioned by blows upon it are very frequent, yet there are some cases that would seem to form exceptions to this. A young man received a kick in the belly from a horse. It occasioned long a constant pain in the fore part of the belly, weakness and indigestion; these were succeeded by a tedious hectic fever, and at last proved fatal. Upon dissection, the omentum was found folded up and contracted round the stomach, forming a solid mass of about an inch and a half in thickness, and connecting the stomach and intestines and liver by its adhesions. The stomach itself was turned to a bloody grumous cancer. The outlines of this case will point out the difficulties which will sometimes occur in unravelling these parts when diseased.

“ Observe the situation of the liver towards the right side; how far it comes down into the right hypochondrium; and how dangerous and improper it consequently is to tap on this side, the more especially as the liver is often enlarged in dropsy. Observe, again, the close connection of the liver with the diaphragm, and how abscesses, originally formed in the liver, may, by the spreading of the inflammation, and by the adhesions with the diaphragm, communicate the suppuration to the lungs, so that the matter from the liver may be coughed up from the breast; or how hydatids, originally formed in the liver, may, by the same communication, be coughed up from the lungs; or how matter in the liver may, by its natural tendency to the surface, propagate the inflammation to the abdominal muscles, and, by forming adhesions with them, be discharged outwardly. In this last case the adhesions, always preceding the formation and progress of matter outwardly, the attachment of the liver and integuments is close and intimate, and the abscess points regularly, so that the operation is very easy. Abscess of the liver, besides being attended with a peculiar painful feeling in the right hypochondrium, is accompanied with a sharp pain of the shoulder and clavicle of the same side; yet it sometimes happens, that the liver is so little sensible, that upon

dissection, there are found great abscesses where the patient, during life, had no complaint. There are, in the writers upon the diseases of hot climates, some strange examples of the extensive communications of these abscesses.

"After having observed the intimate connection of the liver, duodenum, and stomach, it is easy to conceive a case which not unfrequently happens, viz. a discharge of matter into the stomach and intestines, and even a discharge of the food by the external wound, after an operation for abscess of the liver; for it has happened, that the abscess of the liver has formed connections with the stomach on the one hand, and, on the other, opened outwardly upon the side of the belly. It will also be seen how hydatids, getting entangled with the intestines, may be discharged by stool; and how tumors of the liver, pancreas, and spleen, must oppress the stomach.

"With regard to the operation for the collections of matter in the liver, unfortunate mistakes have been made. There is a case mentioned by Haller, of what he calls a spurious aneurism, in which, upon the tenth rib below the scapula, and in the muscular flesh of the back, there seemed to be the pointing of an abscess, which yielded to the fingers; the patient having at the same time a slow fever, and a jaundiced complexion. They had no doubt of its being an abscess of the liver; but the patient died of the violent hæmorrhagy the night following the operation. There is another case which brings home to us still more forcibly the importance of an accurate knowledge of these parts, and of a lively conception of the effects of disease upon them. In l'Hôpital de la Charité, in Paris, the operation for empyema was performed, but no matter flowed from the incision. They had been deceived chiefly by the circumstance of matter being spit up from the lungs. Upon dissection, they found that the matter had been originally formed in the liver, and from it had been communicated to the lungs; but that this communication, having been formed deep in these viscera, no matter could flow from the incision. In Ruysch, there is another case of a country surgeon cutting into the liver, when operating for paracentesis of the thorax; and the case shews, at the same time, the possibility of mistaking enlargement of the liver with hydatids, for hydrothorax. See in SANDIFORT (*Obser. Anat. Path. Lib. III. Cap. V. p. 83. Not. e.*) a curious case of abscess; and indeed instances of such cases are very numerous. It has been found, too, that such is the sympathy between the stomach and liver, that the dressings after the operation for abscess being too much stuffed into the wound, have occasioned violent bilious vomiting, which was removed upon withdrawing them.

"In dissection, there is frequent occasion to remark the softness of the liver when diseased; and it is necessary to observe its co-

lour when not diseased, so as to be able to judge, in any other instance, how far its colour is natural. Often, in disease, it is of a lighter colour, or spotted and marbled, or its thin edges are found tinged with blood as if inflamed, or perhaps they are found livid, which may sometimes be produced by the position of the body after death, and the gravitation of the blood, as happens in the lungs. At any rate, there is seldom active inflammation of the liver. It is often schirrous and enlarged, and then ascites is frequently combined. Its schirrous state, when far advanced, is palpable enough; it feels knobby and irregular on the surface, and, when cut, the tubercles are generally of a light brown colour; (see varieties of these in Baillie's Morbid Anatomy). The liver, the kidney, the spleen, and the uterus, that is, all the solid viscera, seem peculiarly the seat of hydatids, but particularly the liver; and from the bursting of the parent sacs, situated in these parts, the smaller vesicles get entangled with the membranous viscera.

"The last circumstance that seems worthy of notice in this part of the belly, is the obliquity of the diaphragm, and the manner in which the parts lie upon it. If there be a tumor formed in any of those parts that are protruded by the action of the diaphragm, suppose an aneurism of any of the vessels, however the surface of the belly may be moved, the pulsation of this tumor will be continual upon the hand; but if the tumor be situated upon any of the vessels whose attachment to the spine hinders them from being displaced by the motion of the diaphragm, then the action of the diaphragm, and consequent protrusion of the viscera and integuments of the belly, will give the feeling as if its pulsation were subsiding while the tumor retires from the hand. This circumstance, simple as it is, is the more apt to be overlooked, as a patient, when a physician feels his belly, does not breathe regularly, but strains himself, and breathes at intervals."

The drawings from which Mr. Bell's engravings are taken, are highly creditable to the author's ingenuity, and furnish the student with a fair example of the utility, we had almost said the absolute necessity, of the art of designing, for those who wish to become good anatomists and operators.

SECT. II. *Of the METHOD of OPENING a DEAD BODY.*

Surgeons are often called, as has been observed, in order to investigate the cause and seat of diseases and death, either by the relations of the deceased, or the magistrates to whom a report is to be made; therefore, at the time of performing this operation, minutes should be taken of what is observed. The instruments,

and all things necessary, should be disposed in order, as for any other operation; as knives, a razor, a great and small saw, scissars straight and curved, elevators, needles threaded, sponges, tow, saw-dust or bran, basons with water, towels, and receivers for the viscera when they are to be taken out of their cavities. The body is to be laid upon a suitable table, advantageously placed for the light, having a cloth thrown over the parts which decency demands should be concealed, especially in females.

When it is intended only to inspect *the abdomen* and its contents, a longitudinal incision from the xiphoid cartilage to the os pubis, intersected by a transverse one at the navel, will give a fair opportunity of answering these purposes, when the angles are reversed. Should it be required to examine all the three cavities, and the parts contained in them, we are to begin by opening *the head*, making an incision quite across to the bone, from ear to ear; which section is preferable to the crucial, commonly made on this occasion: then the scalp may be easily dissected from the skull, and turned down over the face, and towards the neck, giving room for the saw. The head must be held very steadily by an assistant during the sawing, which should be begun on the middle of the frontal, proceeding to each temporal bone, and so to finish the circle upon the middle of the occipital bone; which may generally be done conveniently enough by raising the head and inclining it forward after having proceeded as far as this bone; or the body may then be turned prone, should that posture be found more convenient to complete the circle. The cap of the skull is then to be raised with the elevator, occasionally cutting the adhesions of the dura mater; after this the encephalon is to be removed, carefully separating the other attachments of the membrane.

In order to bring the *thorax and abdomen*, with the parts contained in these cavities, under one view, an incision is to be made on each side of the sternum, in the course of the cartilages of the ribs which are annexed to it; dissecting from thence the muscles with the teguments, the space of two or three inches towards the spine; then cutting through the cartilages, which will be seen, and easily divided with a knife a little curved near the point; then the incisions are to be continued from the sternum through the abdominal cavity, in an oblique direction, to each ilium or inguen; after which the clavicles are to be separated from the sternum, or this bone divided at the superior cartilaginous junction, with a strong knife, dissecting it from the mediastinum, and turning it downwards with the muscles, &c. of the abdomen. This is the most eligible manner of opening these cavities, and gives an opportunity of sewing them up with a better appearance for any person's view afterwards. That kind of stitch called by sempstresses the *herring-bone*, or *flat-seam*, has a very pretty and neat effect upon these occasions,

If it is purposed to take out the thoracic and abdominal viscera together, for further examination, the diaphragm is first to be cut down to the spine on both sides; then, to avoid being incommoded with blood, &c. two very strong ligatures are to be passed round the œsophagus and large blood-vessels, in which the trachea may be included; tying them strait, and then dividing these parts between the ligatures: the same measures are to be taken in respect to the inferior vessels upon the lumbar region, a little above the bifurcation of the aorta, including the vena cava; and also upon the rectum. After having observed these precautions, the viscera, with the diaphragm, are to be removed by a cautious dissection, all the way close to the spine; and by gently drawing them at the same time, the separation will be greatly facilitated.

When the thoracic and abdominal viscera are to be taken out separately, in the first case ligatures must be made, as have been described upon the vessels, &c. just above the diaphragm, and in the other just below it, and upon the rectum.

Should we be called upon to perform this office *when the body is become very putrid*, it will be absolutely necessary to have such parts of it well washed with warm vinegar and brandy, and then sprinkled with camphorated spirit or some such odoriferous antiputrescent liquor, before the examination, in order to correct the stench, and defend us against the noxious quality of the effluvia; a precaution, the neglect of which may be attended with very direful effects.

CHAP. XLI. OF THE METHOD OF MAKING ANATOMICAL PREPARATIONS.

THERE are two modes of preserving anatomical subjects from putrefaction and the injuries of time, so as to exhibit the different parts of the human body either in their natural or diseased state. These are either preserved in a *dry*, or a *wet* state, i. e. immersed in ardent spirits.

Mr. Charles Bell, in his "*System of Dissections*," gives the following useful directions on the mode of making anatomical preparations by injection:

"To those," says Mr. Bell, "who are commencing their operations, small subjects will be found the most convenient, being more easily managed, and not likely to embarrass the student with much confusion. Besides, his views at first should not be so immediately directed to practice; his object should rather be to acquire general ideas of the anatomy. Young subjects are likewise much fitter for injection (I mean for the injection of the arteries, and for minute injection): they are not only more easily heated and managed, but, what is of more consequence, their blood-vessels have an

elasticity and strength which enables them to bear the push of the injection better, and, by a kind of elastic resistance, to give warning of the danger of rupturing their coats; while, in old bodies, the piston of the syringe goes easily down so far, stops, and, if forced, most probably bursts the vessels, driving the injection amongst the muscles, and giving much trouble in the dissection. When any of the trunks burst in this way, the tension being taken off, their coats contract upon the warm injection, and they remain half filled.

“ In old age, this want of pliancy becomes very remarkable. There is often a kind of stiffness and rigidity, as if the coats of the vessels were corrugated; a degree of that state in which we find the arteries when ossified, or when concretions are formed in their coats.

“ If only some coarse injection is, in a slovenly manner, to be thrown into the great vessels to shew their course, it does not much signify how it is done, or what injection is used, or what means are employed to facilitate the passage of the injection. But if the vessels are to be injected minutely, it is necessary previously to heat the subject well, by bathing it in warm water, or applying steam to the surface. This is of more consequence than even the choice of the subject; for, as the injection is intended to be penetrating and fluid when warm, and, upon becoming cold, to congeal and remain solid in the vessels, it is necessary that the vessels be heated, that they may not suddenly chill the injection: besides, this heating of the body softens and relaxes all the mass of flesh, and brings it to a more suitable state for admitting injection. But it ought to be remembered, that, if the parts be overheated, especially where the vessels to be injected lie exposed, there is danger of spoiling all, by corrugating their coats, and making them quite friable and tender. There is a better way still of heating the subject; viz. by heating the vessels themselves; and, indeed, the two methods should be always combined.—The common practice in the injection of the great vessels, is, to inject first equal parts of brown and white spirit varnish, coloured with the same paint that is used for the coarse or wax injection; and this fine varnish injection, being moderately heated, and thrown in before the wax injection, clears its way, and moderately heats the vessels, so that they do not readily cool or retard the wax injection which is to follow. But when using minute injection (which is size coloured with vermilion), for the purpose of demonstrating the minute vessels, although the hard injection is thrown into the vessels after it, simply to stop the regurgitation of the warm and liquid size, and to retain it in the minutest extremities of the vessels, yet it infallibly happens that the wax injection runs more minutely in this way than in any other. This being the case, it will be found, in all cases, to be a better method to use paint-

ers' size, coloured with vermilion, and heated, but not so much as to crisp the vessels; and to throw it in before the coarse injection. It is the least expensive, runs more minutely, gives always a chance for beautiful specimens of minute injection, and can be pushed to any quantity, even till the skin of the limb becomes quite tense, without rupturing the vessels, or those vessels at least by which the coarse injection can escape. By this means, the vessels are dilated, the limb made warm and moist, and the wax injection flows easily into the arteries, whilst the size escapes with the slightest pressure into the cellular texture.

" There are still other things which require attention; viz. the tying of all collateral vessels that may have been opened, and the fixing of the tube securely in the mouth of the vessel. When the injecting pipe is introduced into the vessel, it cannot be retained there by a simple knot, without a chance of its slipping off during the injection, or, if tied firmly, of cutting the coats of the vessel. Therefore, after the ligature is drawn upon the artery including the tube, the ends of the ligature should be brought over the wings of the tube, and then carried round so as to include that part of the ligature which reaches from the mouth of the tube to the wing; and being tied there, the former knot is tightened, and the mouth of the artery drawn up upon the barrel of the tube.

" The coarse injection is composed of the following ingredients: Bees wax, six ounces; resin, eight ounces; turpentine varnish, six ounces. The wax and resin give hardness and consistency; and the varnish is added to give it pliancy. These colours are generally used: Vermilion, king's yellow, flake white, smalt, verditer, verdigrease, lamp black. They should be mixed with the turpentine varnish, and then added to the wax when melted; and should there be occasion to melt the injection a second time, the heat must be cautiously applied, lest the colours should be burnt and destroyed. The injection should not be thrown into the vessels while too warm, for it will hurt their coats. The degree of heat should be such, that the finger can be allowed to remain in it for a little while.—A coarser composition can be made with tallow, wax, spirit of turpentine, and oil, coloured with the coarser paints; or, simply, tallow and red lead, when the parts are not to be preserved. And for minute injection, turpentine, coloured with vermilion (which Haller preferred to all other injections, for running minutely, and without extravasation); painters' size, coloured with any of the above paints; or equal parts of brown and white spirit varnish.

" When delicate membranes are to be injected either with quicksilver or with fine size, instead of tying all the vessels by which the fluid may escape, I have found it necessary only to sear the edges of the membrane with a heated iron; or, after having fixed the tubes, the common method is to dry the edges all round,

while the middle part is kept soft and moist. When it is required to demonstrate the vascularity of a part where there is no opportunity of injecting it, if membranous, the blood may be detained in the vessels by quickly drying and varnishing it. The blood, when extravasated, or when (as in the piles) preternaturally collected in vessels, may be coagulated by a solution of alum; or blood in inflamed parts may be coagulated by distilled vinegar. In other instances, or in preparations of the lacteals, their natural fluids may be coagulated and preserved by plunging them suddenly into strong spirits.

“ There are many parts of the body which it is impossible to keep for any time in their original beauty, and these the most delicate and interesting; as the organs of the senses, and all minute nervous parts, the villi of the intestines, the comparative anatomy of insects, the incubated egg, &c. The ready demonstration of such delicate parts in the fresh subject is the truest test of the abilities of the practical anatomist; for there is more delicacy and nicety required in exposing these parts, and more real benefit to be derived from them, than in making the more lasting preparations.—The minute structure of many of these parts must be dissected and unravelled under water, where the loose and floating membranes display themselves; while, out of the water, they would lie collapsed and undistinguished. In such investigations, I have found nothing of so much service as jelly made strong and quite transparent. When a delicate part is completely dissected (suppose it to be the coats of the eye), place it in the jelly as it is becoming firm, and hold out the parts; and they will be retained, elegantly displayed, either for demonstration or for drawing.”

Some other observations on this subject, well worth the attention of students, may be found in Mr. Bell's publication, chap. 42.

Citizen Chauffier communicated to the Society of Medicine at Paris, a new method of preserving animal substances. After having enumerated the different methods employed for that purpose, he points out their defects and insufficiency. For preparing parchment, the skins are macerated in water, disengaging from them the unctuous particles, and dissolving likewise a part of the mucilage, so that nothing remains but the fibrous part. For tanning, the hides are put into lime-water, sulphuric acid, or into a solution of alkali, and afterwards exposed to the action of the *tannin* or tanning principle. For preserving anatomical preparations, they are generally put into alcohol, which dries them up, and entirely changes their proper form; and though they are in this way preserved from putrefaction, yet they do not remain untouched by the insects. The carbonat of soda, and the sulphat of iron, which are also used for keeping off putrefaction from animal substances, render them soluble in water by combining themselves with the unctuous particles, and forming a soap with them, whereby the size

and form of the preparations are considerably altered. In order to avoid all these inconveniences, Cit. Chausfier suffers the part intended for preservation to be macerated during a longer or shorter time, from three to eight or ten days, according to their respective size, in a solution of oxygenated muriat of mercury in distilled water. This liquor being always kept in a perfect state of saturation, by adding from time to time fresh muriat of mercury for that which is decomposed, imparts a great solidity to the parts impregnated with it, by giving consistency to the gelatinous parts, without changing their size and form; and when exposed to the air for some time, they are secure from corruption and insects. It is through the medium of this mode of preparation, that Cit. Chausfier has made several interesting observations on the structure of the brain, and particularly of the spinal marrow; for he discovered that this part, after being deprived of its pia mater, is composed of six very distinct bundles; further, that all the nerves which arise from this part of the brain are by no means simple productions of its fibres, but that they are inserted in it like hairs, by means of bulbs which adhere to the medulla by several small roots; and when these nerves are pulled out, a double row of small regular holes will appear to the eye, into which the bulbs are implanted. A portion of brain, presented to the Society by the inventor of this method, had the solidity of wood, without the least change in its natural size and form; another brain and spinal marrow prepared in the same way, very distinctly shewed the holes into which the nerves were ingrafted. The celebrated Ruysch made also use of a liquor and of injections to preserve his excellent anatomical preparations, by means of which he had succeeded in preserving the body of his own daughter, in the colour of life and freshness of youth. This liquor, which he always kept as a mystery, seems to be the same with that of Cit. Chausfier, or at least something analogous. According to Ruysch, it likewise made the gelatin solid, and by degrees as hard as wood; the albuminous matter coagulated by it, and the crystalline lens put into it, became opaque and white; the brain obtained in it a caseous and solid consistency. For colouring the injections, it is advisable to take madder or cinnabar, but never to make them of wax, or any other unctuous matter, but of a mucilaginous solution, as the solution of ichthyocolla, or isinglass. After having injected the parts, they ought to be put into the above solution of oxygenated muriat of mercury, where the matter for injecting concretes, and becomes solid. For preserving whole bodies, it is necessary to make openings into the great cavities, head, chest, and belly, large enough for the liquor to penetrate into them, as without this precaution the intestines will not be secured from corruption. Ruysch himself always made such incisions for the above purpose.

CHAP. XLII. OF EMBALMING DEAD BODIES.

IN the early ages of the world, the practice of embalming dead bodies was very common, particularly among the Egyptians; but it has long been disused in almost all countries, except for great personages. The following directions are taken from Mr. Gooch, to whom they were communicated by a person of great character, and well acquainted with the modern practice of embalming in this kingdom.

After evisceration, as has been directed in opening a dead body, and continuing the incision further upwards, even into the mouth, and, if practicable, without cutting the skin of the neck, all the cavities are to be well cleansed, and the humidity sucked up with sponges, then washed with *tinct. myrrhæ*, and filled with a species compounded of fragrant herbs, aromatic drugs, and gums reduced to powder not very fine, first restoring the heart to its former residence, after having opened its ventricles, cleansed and washed them with the tincture, stuffed them with the spices, and sewed them up; and then the cavities are to be stitched very close with the glovers' or spiral suture. Large and deep incisions are also to be made in all the most fleshy parts, cleansing and washing them with the tincture in the same manner, filling them with the antiseptic spices, and stitching them up. Then the head, trunk, and limbs, are to be perfectly well covered with cerecloth; putting a piece under the chin, to be secured by sewing on the top of the head, after having well adjusted the cap of the skull, sewed the scalp together, and cleaned the mouth, as has been directed for the other parts, and putting in some of the spices. The cerecloth is to be prepared, according to art, with a composition made of wax, rosin, storax, and painters' drying oil. After the application of the cerecloth, with great care and exactness, cut into suitable pieces according to the respective parts, and closing them well every-where, the face, being close shaved, is to be covered with some of the above composition melted, and laid on with a brush, of a proper degree of heat, and of a moderate thickness; which may have a faint flesh-colour given it with vermilion; and when it is grown cold and stiff upon this part, it may be lightly covered with hard varnish; or this varnish, applied thick, may here serve the purpose alone. A cap is to be well adapted to the head, falling down upon the neck, and to be sewed under the chin, making a few circular turns about the neck with a roller of a proper breadth. All the rest of the corpse is to be inclosed in a sheet, to be artfully cut, and sewed on very close and smooth, with the finest tape, and the *flat seam* mentioned in a preceding chapter; over which an appropriate dress is to be put, as the relations or friends think fit to direct and appoint, and then laid into the coffin, which

should be in readiness: but when it is some great personage, who is to lie in state for public view before the funeral rites are solemnized, the dress must be appropriated to his dignity and character. The brain and other viscera are to be put with some of the spices into a leaden box. Sometimes the heart, prepared as has been directed, to preserve it from putrefaction, is deposited in an urn by itself.

The late Dr. WILLIAM HUNTER recommended, in his lectures, the injecting into the blood-vessels as much oil of turpentine, in which camphor and other antiseptic gums were dissolved, as they could be made to receive; and this certainly is a great improvement on the method of embalming above laid down.

A P P E N D I X.

OF SUSPENDED ANIMATION.

THE important art of RESUSCITATION, which, in so many cases, the Surgeon is called on to exercise, is now become an indispensable part of medical education. We shall, therefore, present to the reader's view all that the most enlightened and ingenious writers have offered, both theoretical and practical, on a subject far from being completely understood, but in which, no doubt, considerable advances have been made.

§ I. CAUSES of the EXTINCTION of LIFE in DROWNING.

In some respects there seems to be a great similarity between the death occasioned by immersion in water, called DROWNING, and that by strangulation, suffocation by fixed air, apoplexies, epilepsies, sudden faintings, violent shocks of electricity, or even violent falls and bruises. Medical men, however, are not agreed with regard to the nature of the injury done to the animal system in any or all of these accidents. It is indeed certain, that in all the cases above mentioned, particularly in drowning, there is very often such a suspension of the vital powers as, to us, hath the appearance of a total extinction of them; while yet they may be again set in motion, and the person restored to life, after a much longer submersion than has been generally thought capable of producing absolute death.

De Haen, in his treatise on this subject, ascribes the diversity of opinion among physicians to their having been so ready to draw general conclusions from a few experiments. Some, having never found water in the lungs, have thought that it never was there; and others, from its presence, have drawn a contrary conclusion. Some have ascribed the death which happens in cases of drowning to that species of apoplexy which arises from a great fulness of the

stomach. But this opinion our author rejects; because, in thirteen dogs which he had drowned, and afterwards dissected, no signs of such a fulness appeared. Another reason is drawn from the want of the common marks of apoplexy on the dissection of the brain, and from the actual presence of water in the lungs. He is of opinion, that the death of a drowned person happens in consequence of water getting into the lungs, and stopping the blood in the arteries, and, of course, that blowing into the lungs must be hurtful, as it will increase the pressure on the blood-vessels.

Dr. Cullen, in his letter on this subject to Lord Cathcart, says, that very often the water does not enter the lungs, nor even the stomach, in any material quantity; and that, in most cases, no hurt is done to the organization of the vital parts. Hence he argues, that the death which seems to ensue is owing to the stoppage of respiration, and the consequent ceasing of the circulation of the blood, whereby the body loses its heat and vital principle.

In the *Philosophical Transactions*, vol. lxxvi. Mr. Hunter advances the following theory:—The loss of motion in drowning seems to arise from the loss of respiration; and the immediate effect this has upon the other vital motions of the animal, at least this privation of breathing, appears to be the first cause of the heart's motion ceasing. It is most probable, therefore, Mr. Hunter observes, that the restoration of breathing is all that is necessary to restore the heart's motion; for if a sufficiency of life still remains to produce that effect, we may suppose every part equally ready to move the very instant in which the action of the heart takes place, their actions depending so much upon it. What makes it very probable that the principal effect depends upon throwing air into the lungs is, that children in the birth, when too much time has been spent after the loss of that life which is peculiar to the foetus, lose altogether the disposition for the new life. In such cases there is a total suspension of the actions of life; the child remains to all appearance dead; and would die if air was not thrown into its lungs, and the first principle of action by that means restored. To put this in a clearer light, Mr. Hunter gives the result of some experiments made on a dog in 1755.—A pair of double bellows were provided, which were so constructed, that by one action air was thrown into the lungs, and by the other the air was sucked out which had been thrown in by the former, without mixing them together. The muzzle of these bellows was fixed into the trachea of a dog, and by working them he was kept perfectly alive. While this artificial breathing was going on, the sternum was taken off, so that the heart and lungs were exposed to view. The heart then continued to act as before, only the frequency of its action was greatly increased. Mr. Hunter then stopped the motion of the bellows; and observed that the contraction of the heart became gradually weaker and less frequent, till

it left off moving altogether : but by renewing the operation, the motion of the heart also revived, and soon became as strong and frequent as before. This process was repeated upon the same dog ten times ; sometimes stopping for five, eight, or ten minutes. Mr. Hunter observed, that every time he left off working the bellows, the heart became extremely turgid with blood, and the blood in the left side became as dark as that in the right, which was not the case when the bellows were working. These situations of the animal, he observes, seem to be exactly similar to drowning.

Dr. Goodwyn, in a subsequent treatise on this subject, has endeavoured to ascertain the effects of submersion upon living animals in a still more accurate manner ; and this investigation is accompanied with a most careful and ingenious enquiry concerning the causes of the different phenomena which he remarked in the course of a great number of experiments.

His first care was to determine the symptoms which took place before death ; and, to observe these, he procured a large glass bell in which the animals were to be immersed. Having inverted, and filled this with water, he put into it several cats, dogs, rabbits, and smaller animals, confining them among the water till they were apparently dead. In these experiments he observed, that immediately after submersion the pulse became weak and frequent ; there was an apparent anxiety about the breast, and struggling to relieve it. In these struggles the animal rose to the top of the water, throwing out a quantity of air from the lungs. After this the anxiety increases, the pulse becomes weaker, and the struggles more violent ; he rises again to the surface, throws out more air from the lungs, and in his efforts to inspire, a quantity of water commonly passes into the mouth. The skin about the face and lips then becomes blue, the pulse ceases, the sphincters are relaxed, and the animal falls down without sense or motion. On dissecting the bodies of drowned animals, our author met with the following appearances : 1. The external surface of the brain was darker, but the vessels of it were not more turgid than usual, nor was there any appearance of extravasation. 2. The pulmonary arteries and veins were filled with black blood, and the lungs themselves contained some frothy liquid. 3. Notwithstanding these symptoms, the right auricle and ventricle were still contracting and dilating ; the left sinus venosus and auricle moving feebly, but the left ventricle at rest. 4. The right and left auricles of the heart, the right ventricle, and the left sinus venosus, were filled with black blood ; but the last ventricle only half filled with the same, and a quantity of the same black blood was also contained in the smaller branches of the arteries proceeding from the left ventricle.

This investigation was followed by a most careful and ingenious

enquiry concerning the causes of the symptoms already related. To find out whether or not the entrance of water into the lungs was the cause, or whether water really entered into the lungs in these cases or not, he drowned several animals among ink; and by inspecting their bodies, found, that though water really did enter, it was in such small quantity that it could not be supposed capable of producing such violent effects. To ascertain this, however, more exactly than could be done by the ink, he drowned other animals in quicksilver; which, by reason of its not being miscible with the animal fluids, could be more accurately collected. By these it appeared that no more than five drachms of the fluid in which a cat was immersed entered her lungs in the time of drowning; and to determine whether or not this could be the occasion of the animal's death, he made the following experiment:—Having confined a cat in an erect posture, he made a small opening in the trachea, by cutting one of the cartilaginous rings; and through this opening he introduced two ounces of water into the lungs. The only consequences were a difficulty of breathing and weak pulse; but these soon abated, and it lived several hours afterwards without any apparent inconvenience. On strangling it he found two ounces and a half of water in the lungs. On repeating the experiments with other fluids, he found the difficulty of breathing and alteration in the pulse somewhat greater: but in these instances also they abated in a few hours; and when the animals were strangled, the lungs were found to contain four ounces of fluid.

From a review of these experiments, Dr. Goodwyn draws the following conclusions: “1. A small quantity of fluid usually passes into the lungs in drowning. 2. This water enters the lungs during the efforts to inspire; and mixing with the pulmonary mucus, occasions the frothy appearance mentioned by authors. 3. The whole of this fluid in the lungs is not sufficient to produce the changes that take place in drowning. And hence it follows, that the water produces all the changes that take place in drowning *indirectly*, by excluding the atmospheric air from the lungs.” This naturally leads to an investigation of the uses of respiration, and the effects of the air upon the blood and lungs in that action, which our author traces with great accuracy and very convincing experiments. He begins with attempting to determine the quantity of air drawn in at each inspiration, with the proportional quantity left after expiration. The experiments by which he endeavoured to ascertain these quantities seem to be more uncertain than the others, as, indeed, there are not data sufficient for them. Concerning the chemical changes produced in the air by respiration, and the effects of the air upon the blood itself, we shall only observe in general, that his experiments evidently shew, that the disease produced by drowning arises entirely from the exclusion of

the atmospheric air, or its dephlogisticated part; for which reason he recommends inflating the lungs with that kind of air in preference to any other.

From these different views of the matter, physicians have differed considerably in their account of the methods to be followed in attempting the recovery of drowned persons. De Haen recommends agitation of all kinds; every kind of stimulus applied to the mouth, nose, and rectum; bleeding; heat, both by warm cloths and warm water; blowing air into the trachea; stimulants, such as blisters, warm ashes, &c. applied to the head, ancles, thighs, pit of the stomach, and other parts. Of these we shall now speak.

§ 2. *Of the MEANS to be USED for the RECOVERY of DROWNED PERSONS.*

The following are Dr. Cullen's observations on this subject:—"With respect," says he, "to the particular means to be employed for the recovery of drowned persons, it is to be observed, in the first place, that such as were recommended and practised, upon a supposition that the suffocation was occasioned by the quantity of water taken into the body, and therefore to be evacuated again, were very unhappily advised. The hanging up of persons by the heels, or setting them upon the crown of the head, or rolling the body upon a cask, were generally practised, upon a supposition altogether false; or upon the supposition of a case which, if real, is apprehended to be irrecoverable. At the same time, these practices were always attended with the danger of bursting some vessels in the brain or lungs, and of rendering thereby some cases incurable, that were not so from the drowning alone. All such practices, therefore, are now very properly disapproved of and forbid.

"In those cases in which the body has not been long in the water, and in which therefore the natural heat is not entirely extinguished, nor the irritability of the moving fibres very greatly impaired, it is possible that a good deal of agitation of the body may be the only means necessary to restore the action of the vital organs; but in other cases, where the heat and irritability have ceased to a greater degree, it is to me very doubtful if much agitation can be safe, and if any degree of it can be useful, till the heat and irritability are in some measure restored. In all cases, any violent concussion cannot be safe, and, I believe, is never necessary. It may be proper here to observe also, that, in transporting the body from the place where it is taken out of the water, to the place where it may be necessary for applying the proper means of its recovery, all postures exposing to any improper compression, as that of the body's being carried over a man's shoulder, are to be avoid-

ed. The body is to be kept stretched out, with the head and upper parts a little raised; and care is to be taken to avoid the neck's being bent much forward. In this manner, laid upon one side, and upon some straw in a cart, it may be most properly conveyed; and the agitation which a pretty brisk motion of the cart may occasion, will, in most cases, do no harm.

" From the account I have given above of the causes, or of the appearances, of death, in drowned persons, it is evident, that the first step to be taken for their recovery is to restore the heat of the body, which is absolutely necessary to the activity of the moving fibres. For this purpose, the body, as soon as possible, is to be stripped of its wet clothes, to be well dried, and to be wrapped up in dry, and (if possible) warm coverings: and it is to be wished, in all cases, as soon as the report of a person's being drowned is heard, that blankets should be immediately carried to the water-side, so that, as soon as the body is got out of the water, the change of covering just now mentioned may be instantly made; or, if the body has been naked when drowned, that it may be immediately dried, and defended against the cold of the air. Besides covering the body with blankets, it will be further of advantage, if it can be done without loss of time, to cover the drowned body with a warm shirt or waistcoat immediately taken from a living person.

" When, at the time of a person's being drowned, it happens that the sun shines out very hot, I think there can be no better means of recovering the heat, than by exposing the naked body, in every part, to the heat of the sun; while, at the same time, all other means necessary or useful for the recovery of life are also employed.

" When the heat of the sun cannot be employed, the body should be immediately transported to the nearest house that can be got convenient for the purpose: the fittest will be one that has a tolerably large chamber, in which a fire is ready, or can be made; and, if possible, the house should afford another chamber, in which also a fire can be provided.

" When the drowned body is brought into such house, and care is at the same time taken that no more people are admitted than are absolutely necessary to the service of the drowned person, every endeavour must be immediately employed for recovering the heat of the body, and that by different measures, as circumstances shall direct.

" If, in the neighbourhood of the place, there be any brewery, distillery, dyery, or fabric which gives an opportunity of immediately obtaining a quantity of warm water and a convenient vessel, there is nothing more proper than immersing the body in a warm bath. Even where a sufficient quantity of warm water cannot be had at once, the bath may be still practised, if the accident has

happened in or very near a town or village, when a great many fires may be at once employed in heating small quantities of water; for in this way the necessary quantity may be soon obtained. To encourage this practice, it is to be observed, that one part of boiling water is more than sufficient to give the necessary heat to two parts of spring or sea water, as it is not proper to apply the bath at first very warm, nor even of the ordinary heat of the human body, but somewhat under it; and, by the addition of warm water, to bring it gradually to a heat very little above it.

“ If the drowned body be of no great bulk, it may be conveniently warmed by a person’s lying down in bed with it, and taking it near to their naked body, changing the position of it frequently, and at the same time chaffing and rubbing with warm cloths the parts which are not immediately applied to their warm body.

“ If none of these measures can be conveniently practised, the body is to be laid upon a bed before a moderate fire, and frequently turned, to expose the different parts of it; and thus, by the heat of the fire gradually applied, and by rubbing the body well with coarse towels, or other cloths, well warmed, pains are to be taken for restoring its heat. This will be promoted by warm cloths applied and frequently renewed under the hams and arm-pits; and by hot bricks, or bottles of warm water, laid to the feet.

“ In the practice of rubbing, it has been proposed to moisten the cloths applied with camphorated spirits, or other such stimulating substances: but I think this must prove an impediment to the rubbing; and I would not recommend any practice of this kind, except, perhaps, the application of the vinous spirit of sal ammoniac to the wrists and ancles only.

“ For recovering the heat of the body, it has been proposed to cover it all over with warm grains, ashes, sand, or salt; and where these, sufficiently warm, are ready at hand, they may be employed; but it is very seldom they can be obtained, and the application might often interfere with other measures that may be necessary. All therefore that I can propose, with respect to the use of these, is to observe, that bags of warm and dry salt may be amongst the most convenient applications to the feet and hands of drowned persons; and the quantity necessary for this purpose may be got pretty quickly by heating the salt in a frying-pan over a common fire.

“ While these measures are taking for recovering the heat, means are at the same time to be employed for restoring the action of the moving fibres. It is well known, that the intestines are the parts of the body which, both from their internal situation and peculiar constitution, retain the longest their irritability; and

therefore that, in drowned persons, stimulants applied may have more effect upon the intestines than upon other parts. The action, therefore, of the intestines is to be supported or renewed as soon as possible; as the restoring and supporting the action of such a considerable portion of moving fibres as those of the intestines, must contribute greatly to restore the activity of the whole system.

“ For exciting the action of the intestines, the most proper mean is, the application of their ordinary stimulus of dilatation; and this is most effectually applied by forcing a quantity of air into them by the fundament. Even the throwing in cold air has been found useful: but it will certainly be better if heated air can be employed; and further if that air can be impregnated with something which, by its acrimony, also may be powerful in stimulating the intestines.

“ From all these considerations, the smoke of burning tobacco has been most commonly applied, and has upon many occasions proved very effectual. This will be most properly thrown in by a particular apparatus, which, for other purposes as well as this, should be in the hands of every surgeon; or at least should, at the public expence, be at hand in every part of the country where drownings are likely to happen. With regard to the use of it, I have to observe, that till the tobacco is kindled in a considerable quantity, a great deal of cold air is blown through the box and tube; and as that, as hinted above, is not so proper, care should be taken to have the tobacco very well kindled, and to blow through it very gently, till the heated smoke only passes through. If, upon certain occasions, the apparatus referred to should not be at hand, the measure however may be executed by a common tobacco-pipe, in the following manner: a common clyster-pipe, that has a bag mounted upon it, is to be introduced into the fundament, and the mouth of the bag is to be applied round the small end of a tobacco-pipe. In the bowl of this, tobacco is to be kindled; and, either by a playing card made into a tube, and applied round the mouth of the bowl, or by applying upon this the bowl of another pipe that is empty, and blowing through it, the smoke may be thus forced into the intestines, and, in a little time, in a considerable quantity.

“ If none of these means for throwing in the smoke can be employed, it may be useful to inject warm water to the quantity of three or four English pints. This may be done by a common clyster-bag and pipe, but better by a large syringe; and it may be useful to dissolve in the water some common salt, in the proportion of half an ounce to an English pint, and also to add to it some wine or brandy.

“ While these measures for recovering the heat of the body and the activity of the moving fibres are employed, and especially after

they have been employed for some time, pains are to be taken to complete and finish the business, by restoring the action of the lungs and heart.

“ On this subject, I am obliged to my learned and ingenious colleague, Dr. Monro, who has made some experiments for ascertaining the best manner of inflating the lungs of drowned persons. By these experiments he finds it may be more conveniently done by blowing into one of the nostrils, than by blowing into the mouth. For blowing into the nostril, it is necessary to be provided with a wooden pipe, fitted at one extremity for filling the nostril, and at the other for being blown into by a person's mouth, or for receiving the pipe of a pair of bellows, to be employed for the same purpose. Dr. Monro finds, that a person of ordinary strength can blow into such a pipe with a sufficient force to inflate the lungs to a considerable degree; and thinks the warm air from the lungs of a living person will be most conveniently employed at first; but when it is not soon effectual in restoring the respiration of the drowned person, and that a longer continuance of the inflation is necessary, it may be proper to employ a pair of bellows, large enough at once to contain the quantity of air necessary to inflate the lungs to a due degree.

“ Whether the blowing-in is done by a person's mouth or by bellows, Dr. Monro observes, that the air is ready to pass by the gullet into the stomach; but that this may be prevented, by pressing the lower part of the larynx backwards upon the gullet. To persons of a little knowledge in anatomy, it is to be observed, that the pressure should be only upon the cricoid cartilage, by which the gullet may be straitened, while the passage through the larynx is not interrupted.

“ When, by blowing thus into the nostril, it can be perceived, by the raising of the chest or belly, that the lungs are filled with air, the blowing in should cease; and, by pressing the breast and belly, the air received into the lungs should be again expelled; then the blowing and expulsion should be again repeated; and thus the practice is to be continued, so as to imitate, as exactly as possible, the alternate motions of natural respiration.

“ It is hardly necessary to observe, that when the blowing into the nostril is practised, the other nostril and the mouth should be accurately closed.

“ If it should happen, that, in this practice, the air does not seem to pass readily into the lungs, Dr. Monro informs me, it is very practicable to introduce directly into the glottis and trachea a crooked tube, such as the catheter used for a male adult. For this he offers the following directions: the surgeon should place himself on the right side of the patient; and, introducing the fore-finger of his left hand at the right corner of the patient's mouth, he should push the point of it behind the epiglottis; and

using this as a directory, he may enter the catheter, which he holds in his right hand, at the left corner of the patient's mouth, till the end of it is passed beyond the point of his fore-finger; and it is then to be let fall, rather than pushed into the glottis; and through this tube, by a proper syringe applied to it, air may be with certainty blown into the lungs. I observe, that some such measure had been proposed by *Monf. Le Cat* in France; but I have not learned that it has ever been put in practice, and I am afraid it may be attended with several difficulties, and must be left to the discretion of surgeons, who may be properly provided and instructed for this purpose.

"For throwing air with more certainty into the lungs, it has been proposed to open the windpipe in the same manner as is done in the operation which the surgeons call *bronchotomy*, and by this opening to blow into the lungs; and when the blowing into the nostril does not seem to succeed, and a skilful operator is at hand, I allow that the measure may be tried; but I can hardly suppose that it will be of any advantage when the blowing in by the nostril has entirely failed.

"It is to be hoped, that by blowing into the lungs, one way or other, even a quantity of water which had been taken into the lungs may be again washed out; and the same seems to be the only effectual means of washing out that frothy matter which is found to fill the lungs of drowned persons, and which proves, if I mistake not, the most common cause of their mortal suffocation. This practice, therefore, is to be immediately entered upon, and very assiduously continued for an hour or two together.

"I have now mentioned the measures chiefly to be pursued and depended upon for the recovery of drowned persons; but must still mention some others that may prove considerable helps to it.

"One of these is, the opening the jugular veins to relieve the congestion, which almost constantly occurs in the veins of the head, and is probably a frequent cause of the death of drowned persons. For relieving this congestion, the drawing some blood from the jugulars very early may certainly be of service; and it will be particularly indicated by the livid and purple-colour of the face. It may even be repeated, according to the effect it seems to have in taking off that suffusion; but when the drowned person is in some measure recovered, and some motion of the blood is restored, it will be proper to be very cautious in making this evacuation, and at least to take care not to push it so far as to weaken too much the recovering, but still weak, powers of life.

"Another measure for recovering the activity of the vital principle is the application of certain stimulants to the more sensible parts of the body, such as holding the quick-lime spirit of sal ammoniac to the nose, or putting a little of it upon a rag into the

nostrils. It has been usual to pour some liquids into the mouth; but it is dangerous to pour in any quantity of liquid, till it appear that the power of swallowing is in some measure restored.

“ When a surgeon is at hand, and is provided with proper apparatus, a crooked pipe may be introduced into the gullet; and by this a gill or two of warm wine may be poured down into the stomach, and probably with advantage. But when no such apparatus is at hand, or surgeon to employ it, and the power of swallowing is still doubtful, the trial of pouring liquids into the mouth should be made by a small quantity of warm water alone; and when, from such trial, the power of swallowing shall appear to be recovered, it may then be allowable to favour the further recovery of the person, by pouring in some wine or brandy. In short, till some marks of the recovery of swallowing and respiration appear, it will not be safe to apply any stimulants to the mouth, excepting that of a few drops of some acrid substance to the tongue, and which are not of bulk enough to slide back upon the glottis. I can think of no stimulant more conveniently and safely to be applied to the mouth and nostrils, than a moderate quantity of tobacco-smoke blown into them.

“ Though I do not imagine that drowned persons are ever hurt by the quantity of water taken into their stomachs, yet, as a stimulus applied to the stomach, and particularly as the action of vomiting proves a stimulus to the whole system, I can have no objection to the French practice of throwing in an emetic as soon as any swallowing is restored. For this purpose, I would successively throw in some tea-spoonfuls of the ipecacuanha wine; and, when it does not interfere with other necessary measures, the fauces may be gently irritated by an oiled feather thrust into them.

“ With regard to the stimulants, I must conclude with observing, that when a body has lain but for a short time in the water, and that therefore its heat and irritability are but little impaired, the application of stimulants alone has been often found effectual for the recovery; but, on the contrary, when the body has lain long in the water, and the heat of it is very much extinguished, the application of any other stimulants than that of tobacco-smoke to the intestines can be of very little service; and the application of others ought never to interfere with the measures for recovering heat and the motion of respiration.

“ With respect to the whole of these practices, I expect, from the principles on which they are in general recommended, it will be understood, that they are not to be soon discontinued, though their effects do not immediately appear. It is obvious, that, in many cases, it may be long before the heat of the body, and the activity of the vital principle, can be restored, although, in a longer time, it may very possibly be accomplished. In fact, it has

often happened, that though means employed for one hour have not succeeded, the same continued for two or more hours have, at length, had the wished-for effects. It should therefore be a constant rule in this business, that the proper means should be employed for several hours together; unless it happen, that, while no symptoms of returning life appear, the symptoms of death shall at the same time go on constantly increasing.

“ In the whole of the above I have kept in view chiefly the case of drowned persons: but it will be obvious, that many of the measures proposed will be equally proper and applicable in other cases of suffocation; as those from strangling, the damps of mines, the fumes of charcoal, &c.; and a little attention to the difference of circumstances will lead to the measures most proper to be employed.”

Mr. Hunter, in the before-mentioned paper, differs pretty considerably from De Haen and Dr. Cullen. He observes, that when assistance is soon called in after immersion, blowing air into the lungs will in some cases effect a recovery; but when any considerable time has been lost, he advises stimulant medicines, such as the vapour of volatile alkali, to be mixed with the air; which may easily be done, by holding spirits of hartshorn in a cup under the receiver of the bellows. And, as applications of this kind to the olfactory nerves tend greatly to rouse the living principle, and put the muscles of respiration into action, it may probably, therefore, be most proper to have air impregnated in that manner thrown in by the nose. To prevent the stomach and intestines from being too much distended by the air so injected, the larynx is directed to be gently pressed against the œsophagus and spine.

While this business is going on, an assistant should prepare bed-clothes, carefully brought to a proper degree of heat. Heat our author considers as congenial with the living principle; increasing the necessity of action, it increases action; cold, on the other hand, lessens the necessity, and of course the action is diminished; to a due degree of heat, therefore, the living principle, he thinks, owes its vigour. From experiment, he says, it appears to be a law in animal bodies, that the degree of heat should bear a proportion to the quantity of life; as life is weakened, this proportion requires great accuracy, while greater powers of life allow it greater latitudes.

After these and several other observations on the same subject, our author proceeds to more particular directions for the management of drowned people.

If bed-clothes are put over the person, so as scarce to touch him, steams of volatile alkali, or of warm balsams, may be thrown in, so as to come in contact with many parts of the body. And it might probably be advantageous, Mr. Hunter observes, to have steams of the same kind conveyed into the stomach. This, we are

told, may be done by a hollow bougie, and a syringe; but the operation should be very speedily performed, as the instrument, by continuing long in the mouth, might produce sickness, which our author says he would always wish to avoid.

Some of the warm stimulating substances, such as juice of horseradish, pepper-mint water, and spirits of hartshorn, are directed to be thrown into the stomach in a fluid state, as also to be injected by the anus. Motion possibly may be of service; it may at least be tried; but as it hath less effect than any other of the usually prescribed stimuli, it is directed to be the last part of the process.

The same care in the operator, in regulating the proportion of every one of these means, is here directed, as was formerly given for the application of heat. For every one of them, our author observes, may possibly have the same property of destroying entirely the feeble action which they have excited, if administered in too great a quantity: instead, therefore, of increasing and hastening the operations on the first signs of returning life being observed, as is usually done, he desires they may be lessened; and advises their increase to be afterwards proportioned, as nearly as possible, to the quantity of powers as they arise.

When the heart begins to move, the application of air to the lungs should be lessened, that, when the muscles of respiration begin to act, a good deal may be left for them to do.

Mr. Hunter absolutely forbids blood-letting in all such cases; for, as it not only weakens the animal principle, but lessens life itself, it must consequently, he observes, lessen both the powers and dispositions to action. For the same reason, he is against introducing any thing into the stomach that might produce sickness or vomiting; and, on the same principle, he says, we should avoid throwing tobacco fumes, or any other such articles, up by the anus, as might tend to an evacuation that way.

We have thus far detailed the different theories of the most ingenious medical men of the age, on the subject of suspended animation, and also the practices adapted to them; but with all due deference to those truly great authorities, we think it expedient, nevertheless, to transcribe the concise and practical instructions, circulated by the Royal Humane Society, which are as follows:

1. As soon as the patient is taken out of the water, the wet clothes, if the person is not naked at the time of the accident, should be taken off with all possible expedition on the spot (unless some convenient house be very near), and a great coat or two, or some blankets, if convenient, should be wrapped round the body.

2. The patient is to be thus carefully conveyed, in the arms of three or four men, or on a bier, to the nearest public, or other house, where a good fire, if in the winter season, and a warm bed, can be made ready for its reception. As the body is conveying to this place, great attention is to be paid to the position of the

head; it must be kept supported in a natural and easy posture, and not suffered to hang down.

3. In cold or moist weather, the patient is to be laid on a mattress or bed before the fire, but not too near; or in a moderately heated room: in warm and sultry weather, on a bed only. The body is then to be wrapped, as expeditiously as possible, with a blanket, and thoroughly dried with warm coarse cloths or flannels.

4. In summer, or sultry weather, too much air cannot be admitted. For this reason, it will be necessary to set open the windows and doors, as cool refreshing air is of the greatest importance in the process of resuscitation.

5. Not more than six persons are to be present to apply the proper means; a greater number will be useless, and may retard, or totally prevent, the restoration of life, by rendering the air of the apartment unwholesome. It will be necessary, therefore, to request the absence of those who attend merely from motives of curiosity.

6. It will be proper for one of the assistants, with a pair of bellows of the common size, applying the pipe a little way up one nostril to blow with some force, in order to introduce air into the lungs; at the same time, the other nostril and the mouth are to be closed by another assistant, whilst a third person gently presses the chest with his hands, after the lungs are observed to be inflated. By pursuing this process, the noxious and stagnant vapours will be expelled, and natural breathing imitated. If the pipe of the bellows be too large, the air may be blown in at the mouth, the nostrils at the same time being closed, so that it may not escape that way: but the lungs are more easily filled, and natural breathing better imitated, by blowing up the nostril.

7. Let the body be gently rubbed with common salt, or with flannels sprinkled with spirits, as rum or geneva. A warming-pan heated (the body being surrounded with flannel) may be lightly moved up and down the back. Fomentations of hot brandy are to be applied to the pit of the stomach, loins, &c. and often renewed. Bottles, filled with hot water, heated tiles, covered with flannel, or hot bricks, may be efficaciously applied to the soles of the feet, palms of the hands, and other parts of the body. The temples may be rubbed with spirits of hartshorn, and the nostrils now and then tickled with a feather; and snuff, or *eau de luce*, should be occasionally applied.

8. Tobacco fumes should be thrown up the fundament; if a fumigator be not at hand, a common pipe may answer the purpose. The operation should be frequently performed, as it is of importance; for the good effects of this process have been experienced in a variety of instances of suspended animation. But should the application of tobacco-smoke in this way not be immediately convenient, or other impediments arise, clysters of this

herb, or other acrid infusions, with salt, &c. may be thrown up with advantage.

9. When these means have been employed a considerable time without success, and any brewhouse or warm bath can be readily obtained, the body should be carefully conveyed to such a place, and remain in the bath, or surrounded with warm grains, for three or four hours. If a child has been drowned, its body should be wiped perfectly dry, and immediately placed in bed between two healthy persons. The salutary effects of the natural vital warmth, conveyed in this manner, have been proved in a variety of successful cases.

10. While the various methods of treatment are employed, the body is to be well shaken every ten minutes, in order to render the process of animation more certainly successful; and children, in particular, are to be much agitated, by taking hold of their legs and arms frequently, and for a continuance of time. In various instances agitation has forwarded the recovery of boys who have been drowned, and continued for a considerable time apparently dead.

11. If there be any signs of returning life, such as sighing, gasping, or convulsive motions, a spoonful of any warm liquid may be given; and if the act of swallowing can be performed, a cordial of warm brandy or wine may be given in small quantities, and frequently repeated.

12. Electricity may be tried by the judicious and skilful, as its application neither prevents nor retards the various modes of recovery already recommended; but, on the other hand, will most probably tend to render the other means employed more certainly, and more expeditiously efficacious. This stimulus bids fair to prove an important auxiliary in cases of apparent death; and therefore deserves the serious regard and attention of the faculty.*

The methods which have been described, are to be employed with vigour for three hours or upwards, although no favourable circumstances should arise; for it is a vulgar and dangerous error to suppose that persons are irrecoverable, because life does not soon make its appearance; an opinion that has consigned to the grave an immense number of the seemingly dead, who might have been restored to life by resolution and perseverance. *Bleeding* is scarcely ever to be employed in such cases; since far from giving a stimulus to the circulation, it has a tendency to weaken its force.

* Query.—How far is it likely that GALVANISM, the effects of which are not so *transitory*, may hereafter prove a useful agent in the plan of resuscitation? See our chapter on the medical uses of ELECTRICITY and GALVANISM.

§ 3. *Of the INSTRUMENTS and APPARATUS to be provided.*

As no surgeon should be unacquainted with the instruments and apparatus necessary for the processes of resuscitation, and, indeed, ought himself (more especially if the place of his residence be near a sea-port town, or a navigable river) to be provided with some of them for use on the first moment of alarm, we shall here speak of all that have been hitherto invented.

Description of the Engraving in which the "Implements of Resuscitation from Drowning" are represented. (Pl. VII.)

Fig. 1. A pair of bellows with two separate bags, so contrived that by opening them, when applied to the nostrils or mouth of a patient, one bag will be filled with common air, and the other with the mephitic air extracted from the lungs; and, by shutting them again, pure atmospheric air will be introduced into these organs, and that drawn out consequently discharged into the room. Thus, the artificial breathing may be continued, while the other operations on the surface of the body are carried on; which could not be conveniently done, if the muzzle of a common pair of bellows were introduced into the nostril.

a, Is an intermediate board, but which admits of no communication between the two bags. In the external board of each side, there is the usual hole, marked *b*, provided with a valve; and the cylindrical part through which the air is expelled in common bellows, is here foldered to a copper box, within which two other valves are applied to the tubes conducting the air. The cover *d* of this box, which may be unscrewed by means of an interposed leather ring, is almost of the shape of a funnel, to the neck of which is fastened a flexible tube *e* made of varnished silk cloth, and a spiral wire that forms the cavity. To the extremity of this tube is attached a small ivory pipe *f*, the front of which may either be tubular and round, for introducing it into the nostril; or flat, like the top-piece of a clarionet, if it be intended for the mouth. The valves (which cannot be represented in a plate) consist of stiffened taffety, and are so arranged, that the corresponding ones stand in an inverted order. If, therefore, both bags of the bellows be expanded, *two* of the valves open themselves towards the internal part of the machine: one of these is fixed to one of the side-boards, but the other is within the box, on the mouth of the conducting tube belonging to the opposite bag of the bellows. By this contrivance, the air enters both bags of the bellows at the same time, and is, on compression, again expelled by means of two other valves, which open from within toward the external parts. Both bags of the bellows terminate below the valve in one principal tube of communication; because, though the action of

both bellows is *simultaneous*, the stream of air, conformably to the arrangement before pointed out, can only enter, and escape, *alternately*.—In using this machine, the small ivory pipe is applied either to one of the nostrils, or put into the mouth: in the former case, the other nostril and the mouth must be closed; in the latter, both nostrils. When the bellows are set in action, one of the bags receives a column of atmospheric air through its valve; while the other, by means of its flexible tube and its valve, extracts a portion of air from the lungs. But, if the bellows are again shut, one of the bags parts with the impure gas drawn out of the pulmonary vessels; and the second conveys pure atmospheric air to the organs of respiration. By properly repeating this alternate process, the patient may again be enabled to exercise the important function of breathing. As, however, a precipitate and irregular method of proceeding might be productive of injury, this delicate operation ought to be performed by persons who are acquainted with the mechanism of respiration.—In some cases, where the patient has, for a considerable time, lain under water, or was afterwards neglected for want of due assistance, it would be desirable to introduce into his lungs *oxygen*, or pure vital dephlogisticated air, instead of that of the common atmosphere; as the latter is generally more or less corrupted on such occasions by the breath of many persons in the same room. For this purpose, may be used a bladder, marked *g*, which is provided with a cock and pipe fitted or screwed to the board of the inspiring valve and bag of the bellows. If, therefore, after opening the cock, the machine is set in motion, it will extract the pure air contained in the bladder, and, on the subsequent compression of the bellows, force it into the lungs of the patient.

Fig. 2. A machine for injecting the smoke of tobacco by way of clyster, in those desperate cases which require the application of this remedy. It consists of a pair of bellows, to the muzzle of which is fitted a metal box, *a*, provided with a ring, in the middle of which it may be unscrewed, and again closed, after being filled with tobacco, and set on fire; the pipe *c* (which, by mistake, is represented with a sharp point in some drawings, but should be perfectly round and blunt at the top) of the flexible tube *b*, is introduced into the fundament; and thus, by means of the bellows *d*, the smoke is forced into the rectum.

Fig. 3. A bier of wicker-work, in the form of a slanting, oblong basket, for conveying the body of the drowned, in a posture somewhat raised. This simple contrivance has the advantage, that the water may easily run off, while the patient is carried: and, as many unfortunate persons are materially injured by rough treatment, before they arrive at a house of reception, so that their recovery is thus often frustrated, we recommend the universal adoption of this convenient implement. It costs at Hamburgh only ten marks currency, or about 15s.

Fig. 4. The *Warming Machine* of block tin, or other metal, was originally invented by Mr. Harvey, of London, who suggested it to our Royal Humane Society, and it was subsequently improved by Mr. Braasch, an ingenious mechanic of Hamburgh. Its object is to procure an uniform degree of warmth, throughout the apparatus, in the most expeditious manner, by filling the hollow or double bottom and sides of the whole implement with boiling water.—*a* is the body of the machine, seven feet long, and made of solid pieces of block-tin, to prevent the necessity of soldering them, and consequently the formation of iron-rust: it rests on two wooden legs *ff*, and may be easily carried by the handle *gg*. The water is poured in through both funnels *d, d*, in order to warm it more speedily; and each of these is provided with a stopper as (represented in the plate), suspended on a chain, with a view to prevent, if necessary, too sudden evaporation and cooling of the water:—*b* is the intermediate space between the two metallic plates, producing a vacuum of $2\frac{1}{2}$ inches, in which the fluid is diffused over the whole machine;—*b* is a wooden desk to support the head of the patient, and to protect it from the immediate contact with the heated parts; but, on the opposite end of the machine, there is an enlarged intermediate space, *c*, for holding such a quantity of water and vapours as will procure an additional, or at least a more permanent, degree of heat towards the lower extremities, than to the trunk of the body. For discharging the water when it is not wanted, or changing it when too cold, there is a cock at *e*. The hollow sides of this machine are about twelve inches high; and in order to ensure an uniform warmth, the body apparently dead should be placed on a straw mattress, and tucked in with blankets. A pailful of water is required to fill the whole machine, as a smaller quantity would warm the sides only for a short time, by means of the vapour.

It deserves to be remarked, that this ingenious contrivance may also be used for a *warm bath*; for which purpose, the inner space in which the body lies, should be supplied with water. The whole apparatus, in its present improved state, made of *copper*, costs at Hamburgh about 200 marks, or from 14 to 15*l*.

Mr. Redlich, a medical practitioner of respectability at Hamburgh, one of the most active members of the Humane Society in that city, has offered the following articles for sixty-five marks, or about four guineas and a half. His complete chest contains:

Small bottles of rectified spirit of wine; white-wine vinegar; sweet oil; brandy; volatile sal ammoniac; vitriolic æther.

A small bottle of mustard-seed.

A machine for injecting the smoke of tobacco.

A leather tube, together with a pair of bellows, for inflating the lungs.

Another tube of leather, for introducing medicines into the stomach.

A small syringe for clearing the throat of mucus.

Three woollen covers or blankets.

Four brushes, and six woollen cloths, for performing friction;

Several emetics.

Two lancets for blood-letting.

One pound of tobacco.

A roller and cushion, to be used in venæsection.

Two quills, a sponge, and some lint.

A pocket-knife.

An apparatus for striking fire.

Chamomile and elder-flowers.

Common salt:—and a printed copy of rules and directions for treating the drowned.

OF ELECTRICITY AND GALVANISM, AND THEIR EFFECTS IN DISEASES:

Although medical electrization is practised in the metropolis, and even in some of the large towns in Great-Britain, as a distinct profession; yet, in remote situations, this remedy is for the most part administered by practitioners in surgery. This being the case, it necessarily belongs to a work of this nature to offer some instructions on the subject.

It cannot be denied, that *medical electricity* has been only of late years reduced to a systematic form, and that we are in *this* respect particularly indebted to the labours of Tiffot*, Cavallo, and Bertholin. The last of these meritorious characters framed a peculiar theory, according to which he derived all diseases either from the want or abundance of the electric fluid in the human body. He invented several useful instruments, and his method of applying them introduced a happy medium between the violent shocks recommended by some, and the timid practice of electrifying followed by others. By the exertions of such men, we at length arrived at stable principles, established on the broad basis of experience, by which we were taught, that electricity increases or promotes the circulation of the blood, and produces this effect particularly by what is called the *negative bath*. Thus we learned, by satisfactory proofs, that the electric fluid operates as a stimulating remedy on the animal body, and that in situations accessible to no other kind of stimulus.

* The celebrated Tiffot was unquestionably the first who treated scientifically on the medical application of electricity, exhibiting also just principles on which to found this process, in his classical letter, '*Dé variolis, apoplexia, et hydropse.*'

Meanwhile, the well-known experiments of Galvani with the metallic stimulus, excited an uncommon degree of attention in the medical world; but the consequent theories were too hastily formed, and pursued with hypothetical fallacy. This species of stimulus is certainly insufficient to afford a sure criterion of actual death, and to ascertain clearly the state of asphyxia, for this additional and obvious reason, that the disposition or tendency of the muscular fibre to be affected to such a degree as to be thrown into convulsions by the application of metals, is considerably diminished in certain diseases, for instance, the gout and rheumatism; it must, however, be admitted that the nerves are very sensible electrometers, and that the animating principle which pervades them, is forcibly stimulated in the transition of the electric fluid from one metal to another.

Whether the medical effects of electricity and Galvanism are to be considered *alike*, or in what respects they differ, are points not yet ascertained by medical philosophers, and for that reason, we purpose treating the subjects distinctly.

§ I. Of ELECTRICITY.

Electricity is generally thought to be one of the most powerful stimulating remedies which can be applied to the animal economy. Its effects may be considered both as constitutional and local. Too violent shocks of it at once extinguish the vital principle, which, however, may be again kindled or excited by less powerful shocks. Hence, in speaking of its effects on the constitution, the following positions may be admitted, to a certain extent, as correct and established;—that electricity promotes the free circulation of the fluids, and particularly the blood; that it accelerates perspiration, and increases animal heat, and likewise promotes all the secretions and excretions of the body*. But the most accurate way in which we can speak of electricity, as a remedy in local affections, is that suggested by Mr. Abernethy, viz. that it has a tendency to promote *whatever action or process happens to be going on*, in a diseased part, at the time of its application.

In the application of this powerful remedy, the following hints may be of service, as they are the result of actual experience, and not of speculation: 1. Electricity is attended with pernicious effects in *active* or *sthenic* diseases: 2. it is hurtful when, together with relaxation and debility, an uncommonly high degree of excitability in the organs of sensation is felt, as well as in those of

* It may properly be remarked here, that the effect of promoting the secretions and excretions by means of electricity, will then only take place when these have been diminished by atonic causes.

voluntary motion; and 3. if a preratural impulse of the fluids, arising from local irritation, prevail in any particular part of the body. In this case, electricity has a direct tendency to generate congestions, or the local accumulation of humours. In atonic collections of matter it is frequently found of service, when the great vital activity of the solids alone is capable of resolving the stagnations; but it is certainly detrimental, if the mechanical power of resistance in the solid parts must, at the same time, be raised; and if the accumulated matter must be previously diminished, before it can be dissolved. Hence the application of electricity has sometimes been highly beneficial in promoting a regular return of the menses; but it has also, in certain cases, been attended with injurious effects.—It is further of considerable advantage in passive or asthenic diseases, particularly in cases accompanied with a diminished susceptibility of stimuli in the organs of sensation and motion; provided that such disorder at the same time, be manifest from the periodical returns of uncommon muscular action, or by occasional excess of the sensitive faculty in any particular part. Lastly, the mode of imparting the electric fluid deserves more attention than has hitherto been bestowed upon it; and we ought never to communicate violent shocks, where less powerful ones might answer the purpose. Upon the whole, it appears to be an established maxim that, under the circumstances and conditions above specified, both the electric bath, and the gentle application of the electric fluid to any particular part of the body, are always safe; and that the extraction of sparks under similar circumstances is generally attended with advantage. The more violent methods of electrifying, on the contrary, have been productive of mischief rather than good; so that they ought to be applied to those individuals only, whose excitability is languid, or whose capacity for receiving impressions by external stimuli, is considerably diminished.

Mr. Cavallo, who has published the best treatise on Medical Electricity, entirely disapproves of giving violent shocks, and finds it most efficacious to expose the patient to the electrical aura discharged from an iron or a wooden point; or if shocks are given, they should be very slight, and not exceed 12 or 14 at a time. In this way he recommends it as effectual in a great number of disorders. The patient may be electrified from three to ten minutes; but if sparks are drawn, they should not exceed the number of shocks above mentioned.

1. *Rheumatic disorders*, even of long standing, are relieved, and generally quite cured, by only drawing the electric fluid with a wooden point from the part, or by drawing sparks through flannel. The operation should be continued for about twenty minutes, repeating it once or twice every day.

2. *Deafness*, except when it is occasioned by obliteration or other improper configuration of the parts, is either entirely or partly

cured by drawing the sparks from the ear with the glass tube director, or by drawing the fluid with a wooden point. Sometimes it is not improper to send exceedingly small shocks (for instance, of one-thirteenth of an inch) from one ear to the other.—It has been constantly observed, that whenever the ear is electrified, the discharge of the wax is considerably promoted.

3. *The tooth-ach*, occasioned by cold, rheumatism, or inflammation, is generally relieved by drawing the electric fluid with a point, immediately from the part, and also externally from the face. But when the body of the tooth is affected, electrization is of no use; for it seldom or never relieves the disorder, and sometimes increases the pain to a prodigious degree.

4. *Swellings* in general, which do not contain any matter, are frequently cured by drawing the electric fluid with a wooden point. The operation should be continued for five or ten minutes every day.—It is very remarkable, that in some cases of white swellings, quite cured by means of electricity, the bones and cartilages were in some measure disfigured.

5. *Inflammations* of every sort have occasionally been relieved by a very gentle electrization; but if far advanced, its tendency is rather to promote suppuration, agreeably to what we have already said of the disposition of electricity to forward any process that seems to be then going on in the part.

6. In *inflammations of the eyes*, the throwing of the electric fluid by means of a wooden point, is often attended with great benefit; the pain being quickly abated, and the inflammation being generally dissipated in a few days. In these cases, the eye of the patient must be kept open; and care should be taken not to bring the wooden point very near it, for fear of causing a spark. Sometimes it is sufficient to throw the fluid with a metal point; for in these cases, too great an irritation should be always avoided. It is not necessary to continue this operation for three or four minutes without intermission; but after throwing the fluid for about half a minute, a short time may be allowed to the patient to rest and to wipe his tears, which generally flow very copiously; then the operation may be continued again for another half-minute, and so on for four or five times every day.

7. *The gutta serena* has been sometimes cured by electrization; but at the same time it must be confessed, it has proved ineffectual in many such cases, in which it was administered for a long time, and with all possible attention. However, it has never been known that any body was made worse by it. The best method of administering electricity in such cases, is first to draw the electric fluid with a wooden point for a short time, and then to send about half a dozen of shocks of one-twentieth of an inch from the back and lower part of the head to the forehead, very little above the eye.

A remarkable disease of the eye was some time ago perfectly

cured by electrization; it was an opacity of the vitreous humour of the eye.

8. All the cases of *fistula lacrymalis*, which Mr. Cavallo hath known to have been electrified by persons of ability, for a sufficient time, have been entirely cured. The method generally practised has been that of drawing the fluid with a wooden point, and to take very small sparks from the part. The operation may be continued for about three or four minutes every day. It is remarked, that in those cases, after curing the *fistula lachrymalis*, no other disease was occasioned by it, as blindness, inflammations, &c. by suppressing that discharge.

9. *Palsies* are seldom perfectly cured by means of electricity, especially when they are of long standing; but they are generally relieved to a certain degree. The method of electrifying in those cases, is to draw the fluid with the wooden point, and to draw sparks through flannel, or through the usual coverings of the part if they are not too thick. The operation may be continued for about twenty minutes per day.

10. *Ulcers*, or open sores of every kind, even of a long standing, are generally disposed to heal by electrization. The general effects are a diminution of the inflammation, and at first a promotion of the discharge of properly formed matter; which discharge gradually lessens, according as the limits of the sore contract, till it be quite cured. In these cases the gentlest electrization must be used, in order to avoid too great an irritation, which is generally hurtful. To draw or throw the fluid with a wooden or even with a metal point, for three or four minutes per day, is fully sufficient.

11. *Cutaneous eruptions* have been successfully treated with electrization; but in these cases it must be observed, that if the wooden point be kept too near the skin, so as to cause any considerable irritation, the eruption will be caused to spread more; but if the point be kept at about six inches distance, or farther, if the electrical machine be very powerful, the eruptions will be gradually diminished, till they are quite cured. In this kind of disease, the immediate and general effect of the wooden point is to occasion a warmth about the electrified part, which is always a sign that the electrization is rightly administered.

12. The application of electricity has perfectly cured various cases of *St. Vitus's dance*, or of that disease which is commonly called so; for it is the opinion of some very learned physicians, that the real disease called *St. Vitus's dance*, which formerly was more frequent than it is at present, is different from that which now goes under that name. In this case shocks of about one tenth of an inch may be sent through the body in various directions, and also sparks may be taken. But if this treatment prove very disagreeable to the patient, then the shocks must be lessened,

and even omitted; instead of which, some other more gentle applications must be substituted.

13. *Scrophulous tumors*, when they are just beginning, are generally cured by drawing the electric fluid with a wooden or metal point from the part. This is one of those kinds of diseases in which the action of electricity requires particularly the aid of other medicines in order to effect a cure more easily; for scrophulous affections commonly accompany a great laxity of the habit, and a general cachexy, which must be obviated by proper remedies.

14. In *cancers*, the pains only are commonly alleviated by drawing the electric fluid with a wooden or metal point. Mr. Cavallo, however, mentions one case in which a most confirmed cancer of very long standing, on the breast of a woman, had been much reduced in size. It is remarkable, that this patient was so far relieved by drawing the fluid with a metal point from the part, that the excruciating pains she had suffered for many years did almost entirely disappear; and also, that when the electric fluid was drawn by means of a wooden point, the pains did rather increase.

15. *Abscesses*, when they are in their beginning, and in general whenever there is any tendency to form matter, are dispersed by electrization. Lately, in a case in which matter was formed upon the hip, called the *lumbar abscess*, the disease was perfectly cured by means of electricity.* The *sciatica* has also been often cured by it. In all such cases, the electric fluid must be sent through the part by means of two directors applied to opposite parts, and in immediate contact either with the skin, or with the coverings, when these are very thin. It is very remarkable, that the mere passage of the electric fluid in this manner is generally felt by the patients afflicted with those disorders, nearly as much as a small shock is felt by a person in good health. Sometimes a few shocks have been also given, but it seems more proper to omit them; because sometimes, instead of dispersing, they rather accelerate the formation of matter.

16. In cases of *pulmonary inflammations*, when they are in the beginning, electrization has been sometimes beneficial; but in confirmed diseases of the lungs, it does not seem to have ever afforded any unquestionable benefit; however, it seems that in such cases the power of electricity has been but seldom tried.

17. *Nervous head-achs*, even of a long-standing, are generally cured by electrization. For this disease, the electric fluid must be thrown with a wooden, and sometimes even with a metal point, all round the head successively. Sometimes exceedingly small shocks have been administered: but these can seldom be used, because the nerves of persons subject to this disease are so very irri-

* See what has been said on the use of electricity in the *Lumbar Abscess*, by Mr. Abernethy, Vol. III. p. 533, of this work.

table, that the shocks, the sparks, and sometimes even the throwing the electric fluid with a wooden point kept very near the head, throw them into convulsions.

18. The application of electricity has often been found beneficial in the *dropsy*, when just beginning, or rather in the tendency to a dropsy; but it has never been of any use in advanced dropsies. In such cases, the electric fluid is sent through the part, in various directions, by means of two directors, and sparks are also drawn across the flannel, or the clothes; keeping the metal rod in contact with them, and shifting it continually from place to place. This operation should be continued at least ten minutes, and should be repeated once or twice a-day.—Perhaps in those cases, a simple electrization (viz. to insulate the patient, and to connect him with the prime conductor whilst the machine is in action), continued for a considerable time, as an hour or two, would be more beneficial.

19. The *gout*, extraordinary as it may appear, has certainly been cured by means of electricity, in various instances. The pain has been generally mitigated, and sometimes the disease has been removed so well as not to return again. In those cases, the electric fluid has been thrown by means of a wooden point, although sometimes, when the pain was too great, a metal point only has been used.

20. *Agues* have not unfrequently been cured by electricity, so that sometimes one electrization or two have been sufficient. The most effectual and sure method has been that of drawing sparks through flannel, or the clothes, for about ten minutes, or a quarter of an hour. The patients may be electrified either at the time of the fit, or a short while before the time in which it is expected.

21. *The suppression of the menses*, which is a disease of the female sex that often occasions the most disagreeable and alarming symptoms, is often successfully and speedily cured by means of electricity, even when the disease is of long standing, and after the most powerful medicines used for it have proved ineffectual. The cases of this sort in which electrization has proved useless are so few, and the successful ones so numerous, that the application of electricity for this disease may be justly considered as an efficacious and certain remedy. Great attention and knowledge is required, in order to distinguish the arrest of the menses from a state of pregnancy. In the former, the application of electricity, as we observed above, is very beneficial; whereas, in the latter, it may be attended with very disagreeable effects: it is therefore a matter of great importance to ascertain the real cause of the disease, before the electricity be applied in those cases. Pregnant women may be electrified for other diseases, but always using very gentle means, and directing the electric fluid through other parts of the body distant from those subservient to generation. In the real suppress-

sion of the menses, small shocks, *i. e.* of about one twentieth of an inch, may be sent through the pelvis; sparks may be taken through the clothes from the parts adjacent to the seat of the disease; and also the electric fluid may be transmitted by applying the metallic or wooden extremities of two directors to the hips, in contact with the clothes; part of which may be removed in case they be too thick. Those various applications of electricity should be regulated according to the constitution of the patient. The number of shocks may be about 12 or 14. The other applications may be continued for two or three minutes; repeating the operation every day. But either strong shocks, or a stronger application of electricity than the patient can conveniently bear, should be carefully avoided; for by those means, sometimes more than a sufficient discharge is occasioned, which is not easily cured. In cases of uterine hæmorrhagies, it is not known that the application of electricity was ever beneficial. Perhaps a very gentle electrization, so as to keep the patient insulated and connected with the prime conductor, whilst the electrical machine is in action, may be of some benefit.

22. In respect to *unnatural discharges* and *fluxes* in general, it may be observed, that some discharges are quite unnatural or adventitious, as the fistula lachrymalis, and some species of the venereal disease; but others are only increased natural discharges, such as the menses, perspiration, &c. Now the power of electricity in general has been found more beneficial for the first than for the second sort of discharges, which are mostly increased by it.

23. In the *venereal disease*, electrization has been generally forbidden; having commonly increased the pains, and other symptoms, rather than diminished them. Indeed, considering that any sort of stimulus has been found hurtful to persons afflicted with that disorder, it is no wonder that electricity has produced some bad effects, especially in the manner it was administered some time ago, *viz.* by giving strong shocks. However, it has been observed by some surgeons, that a very *gentle* application of electricity, as drawing the fluid by means of a wooden or metal point, is peculiarly beneficial to venereal complaints, even when the disease has been of long standing. Perhaps, Cit. Coquart's late observations on some effects of lightning and electricity in gonorrhœa, may throw some light on this disputed point of surgical practice.

“ Towards the end of July, 1800, Cit. N. aged forty, of a very irritable constitution, had a gonorrhœa during fifteen days, attended in the beginning with inflammatory symptoms. The patient, however, was so far recovered by a proper treatment, that the pains, as well as the running, considerably abated. One night when he was sleeping on his bed, almost naked, and with the windows open, he was suddenly awakened by the noise of thunder; he leaped from his bed, and having walked in the chamber for

some minutes, he went to bed again. He, however, immediately felt some pains in the perinæum, and had a restless night. The next morning he had a complete suppression of urine, and all his attempts to make water produced nothing but a few drops of blood; the running had likewise ceased. The patient was immediately ordered to be put into a bath, and he then made a little water mixed with blood. About mid-day another bath was used, after which the urine proceeded in small streams, and bloody. When he had taken a third bath in the evening, no more blood came off with the urine; and by a strict regimen, the natural flow of the urine was re-established. The patient went afterwards into the country, and having discontinued the baths, the gonorrhœa spontaneously returned; the matter was milky, and not copious; the pains in the perinæum were slight, and only felt at the time of erection. Some time after, the running, and all the other symptoms of the gonorrhœa, disappeared entirely. This observation naturally leads to the question, whether the suppression of urine is to be attributed to the surprise of the patient, by being so suddenly awakened by the noise of thunder, or to an electric action? However," adds the author, "this effect of electricity is not quite so much proved as in the following observation."

"An Englishman, who had for the space of two years a running from the urethra, against which he had consulted the best practitioners in France and England, without the least success, applied at last to Citizen Rouelle, physician at Loeven, of great reputation. This gentleman having again tried all possible internal and external remedies to no purpose, had recourse to electricity, with which he used to amuse himself. Having, therefore, introduced into the urinary canal of the patient an iron thread, he drew out of it only one electric spark, whereupon the patient instantly felt a vehement pain in the perinæum; the gonorrhœa, however, completely disappeared, and the patient was perfectly cured."

But whether the direct application of this stimulus be desirable or not in the treatment of *venereal symptoms*, there is a great singularity attends its use in those persons who are *under the effects of a mercurial course*. In these, the shock, or even the spark, is attended with *considerably more pain* than in common instances; and Mr. Hunter, in his Treatise on the Venereal Disease, mentions the case of a person on whose complaint electricity had no effect, *till* mercury was administered, *after which* the same remedy produced a cure. Would not a previous mercurial course, therefore, in some cases (particularly of the *atonic* kind) give unexpected efficacy to electrization?

The application of electricity has been found also beneficial in some other diseases besides those mentioned above; but as the facts are not sufficiently numerous to afford the deduction of any ge-

neral rules, we do not take particular notice of any but the following:

24. Dr. Fricke, of Brunswick, has lately made several successful experiments, not only to discover the *tape-worm*, but likewise to destroy and expel it, by the powerful aid of electricity. The proper application of the electric fluid, according to his account, almost instantaneously relieves the most violent symptoms, such as anguish, oppression, spasmodic stricture in the præcordia, &c. The manner of applying electricity to individuals suspected to be harassed by the tape-worm, is as follows:

Dr. F. uses a conductor with a globe of two inches and a half in diameter, from which he causes the sparks to strike against a globe of an insulated *scintillometer*: these sparks he passes in different directions through the abdomen; but, at first, admits them only from three to four inches long. As soon, however, as the patient can conveniently bear this kind of vibration, sparks to the length of from ten to twelve inches are admitted: and the more powerful these are, the more speedy will be the relief.

Dr. Fricke's scintillometer consists of a metal cylinder, thirty inches long, which lies insulated upon a pedestal, in a horizontal direction; it is divided into inches, and may be slid backwards and forwards. On one extremity, this cylinder is provided with a brass globe, four inches in diameter, on which the sparks strike from the conductor: the other extremity is provided with a ring. To this ring he fastens a metal chain or wire, covered with silk, which is connected with an insulated director. Another director, likewise insulated, is added, by means of a chain, to that part of the machine which performs the friction: and by these two directors, which, for the sake of conveniency, are conjoined like a pair of tongs, the passage of the sparks is constantly regulated, while the patient sits on a common chair.

As the symptoms of the tape-worm usually begin with severe tension and oppression about the region of the stomach, the first sparks are directed through the pit of the stomach, in a straight line towards the vertebræ. After several sparks have been administered, eructations frequently take place; the patient feels much relieved in that particular part, but generally perceives the motion of another part of the worm, in some other place. Thither the sparks are again directed, and the worm is incessantly pursued, until it can be distinctly felt by the patient like a heavy weight.

To a lady who had been much troubled with the tape-worm, Dr. Fricke prescribed half a drachm of powder of jalap, and carefully applied the electricity in the manner before described, during the operation of this remedy: in consequence of such treatment, the patient discharged a tape-worm upwards of 20 yards long.

We wish, in conclusion, to observe, that, in applying *electricity*, the different auxiliary remedies directed in the foregoing

parts of this work, are by no means to be forgotten. Indeed this remedy is, at best, too uncertain and capricious for us to place implicit confidence in it; and whilst its powers are *now and then* displayed in most *wonderful* instances, we are liable to repeated disappointments in employing it even in the most simple cases of local disease*.

§ 2. On GALVANISM.

The experiments of modern philosophers have shewn, that certain convulsive motions on the nerves of living and dead animals, may be excited by the application of metallic or other conductors of electricity; but these motions may also be induced, by simply touching the animal fibre with two different metals, that are brought in contact with each other at the same moment. Whatever two metals be chosen, they will, with a few exceptions, produce those remarkable contractions, when applied in the manner hereafter described; but the most powerful are, zinc and silver, or zinc and gold; or in general, zinc, tin, or lead, when used in combination with gold, silver, molybdena, steel, or copper.

These singular phenomena take place in consequence of a mutual communication between any two points of contact, whether more or less distant, in a system of muscular and nervous organs. The extent of this communication may be considered as a complete circle divided into two parts, one of which, comprising the organs of the animal under the experiment, is called the *animal arc*, the other, which is formed by the metals or *Galvanic* exciters, is denominated the *excitatory arc*; and consists of more than one piece, of various kinds.

Besides the effects thus produced on the muscles, the impressions made on the organs of sense are equally remarkable. And as the experiments illustrating them may be easily repeated, we shall specify some of the most interesting. For instance, if a thin plate of zinc be placed on the upper surface of the tongue, and a half-crown, shilling, or silver tea-spoon, be laid on the lower surface of the tongue, and both metals after a short space of time be brought into contact, a peculiar sensation, similar to taste, will be perceived at the moment when the mutual touch happens. If the silver be put beneath, and the zinc upon the tongue, the same sensation will arise, but in a weaker degree, resembling diluted ammoniac, from which in all probability it derives its origin.

* We have thought a description of the electrical apparatus, and the manner of producing and directing the electrical fluid, in different shapes, unnecessary, as these are almost universally known. Those, however, to whom information of this kind is an object, may consult Mr. Cavallo's work, or the late Mr. George Adams's Treatise on Electricity.

If a silver probe be introduced as far as convenient into one of the nostrils, and then be brought into contact with a piece of zinc placed on the tongue, a sensation not unlike a strong flash of light will be produced in the corresponding eye, at the instant of contact. A similar perception will result, both at the moment of contact and at that of separation, if one of the metals be applied as high as possible between the gums and upper lip, and the other in a similar situation with the under lip, or even under the tongue. —Lastly, when a probe or rod of zinc, and another of silver, are introduced as far back as possible into the roof of the mouth, the irritations produced by bringing the external ends into contact, are very powerful; and that caused by the zinc is similar in taste to the sensation arising from its application to the tongue.

But it is on the *vast accumulation of this power* in Sign. Volta's apparatus (or *pile*, as it is called), the discovery on which the application of Galvanism to medical purposes chiefly depends. It consists of a number of copper or silver plates (which last are preferable), together with an equal number of plates composed of tin, or still better of zinc, and a similar number of pieces of card, leather, or woollen cloth, the last of which substances appears to be the most suitable. These last should be well soaked in water saturated with common salt, muriat of ammonia, or more effectually with nitre. —The silver or copper may be pieces of money, and the plates of zinc may be cast of the same size. A pile is then to be formed, by placing a piece of silver on a corresponding one of zinc, and on them a piece of wet cloth, or card; which is to be repeated alternately, till the number required be arranged in regular succession. But, as the pieces are apt to tumble down, if their numbers be considerable, unless properly secured, it will be advisable to support them by means of three rods of glass, or baked wood, fixed into a flat wooden pedestal, and touching the pieces of metal at three equi-distant points. Upon these rods may be made to slide a small circular piece of wood perforated with three holes, which will serve to keep the top of the pile firm, and the different layers in close contact. The moistened pieces should likewise be somewhat smaller than those of the metal, and gently squeezed before they are applied, to prevent the superfluous moisture from insinuating itself between the pieces of metal; (see a representation of this pile in Plate V.) Thus constructed, the apparatus affords a perpetual current of the animal-electric fluid, or Galvanic influence, through any conductor that communicates between the uppermost and lowest plate; and, if one hand be applied to the latter, and the other to the highest metal, a shock will be perceived, which may be repeated as often as the contact is renewed. This shock greatly resembles that given by the torpedo, or *gymnotus electricus*: and, according to the larger size of the metallic plates, the shock will be proportionably stronger. The intensity of the charge,

however, is so low, that it cannot penetrate the *dry* skin; it will therefore be necessary to wet both hands, and to grasp a piece of metal in each, in order to produce the desired effect: its power may be considerably increased, both by an elevation of temperature, and by augmenting the number of pieces that compose the pile. Thus twenty pieces of each will emit a shock, that is very perceptible in the arms; if 100 be employed, a very severe but tremulous and continued sensation will extend even to the shoulders; and, if the surface of the skin be broken, the action of the Galvanic influence will be uncommonly painful.

The sensation of a flash or shock with this apparatus, does not materially differ from that produced by two simple plates; but it may be effected in various ways, especially if one or both hands be applied in a wet state to the lowest plate of the pile; or any part of the face be brought in contact with a wire communicating with the top piece. Further, if a wire be held between the teeth, so as to rest upon the tongue, that organ, as well as the lips, will become convulsed, the flash will appear before the eye, and a very pungent taste will be perceived in the mouth.

Many other curious facts have transpired on this interesting discovery; but, as they have not been hitherto applied to medical purposes, we must refer the curious reader to Dr. Fowler's "*Essay on Animal Electricity*," for a further account, and shall proceed to a part of the subject most essential to a work of this kind, namely, the individual purposes to which Galvanism is applicable in the cure of diseases.

Dr. Augustin, of Berlin, in his pamphlet on Galvanism and its medical application, after giving a brief but judicious account of its phenomena, concludes with a description of the effects of Volta's column or pile on the human body, and points out the diseases in which it may be successfully employed. We cannot possibly do the subject (*new* as it is in medicine) greater justice, than by following so excellent a guide.

"When a pile," says the doctor, "is properly constructed, so as to shew itself perfectly efficacious, a most sensible stroke will be felt, on touching with wet hands, or by means of silver spoons, the upper and lower extremities of the pile; the sensation, however, does not extend itself, nor penetrate into the breast so much as from an electrical stroke; but when the chain is continued to be shut, the sensation becomes more permanent and disagreeable, which likewise takes place on putting each chain into a glass of water, and holding each hand in one of the glasses. These sensations, however, prove more lively when the pile is fresh constructed, but decrease the longer it stands, particularly when the ends of the pile have been combined with each other by the contact of the two chains. It is however singular, that the force of the pile

may be renewed and restored by shaking the chains. The pungent pain perceived on touching both ends of the pile with wet fingers increases, if he, who touches them, is insulated. When several persons take hold of one-another by the hands, which must be wet, and when those at the two ends touch the two extremities of the pile, all of them receive a slight sensation, which is not so strong as in a single person, though it becomes stronger if they are insulated. The commotions become evidently more lively on moistening the fingers, with which the extremities of the pile are touched, with a solution of common salt, but they are the most forcible if a part of the touching fingers is deprived of its epidermis. Galvanism, applied by means of Volta's pile, shews a most sensible effect on the organs of sense, and particularly on the eyes; for on applying the two wires of the zinc and silver side on the skin beneath the eye-lids, which has been previously moistened with salt water, a burning pain will arise, and the light be put into a vibrating motion alternately in both eyes, which continues as long as the wires remain at the above place. The same phenomenon appears, when we touch with one hand a wire that is placed in a glass of water, whilst we apply the wet eye-lid to the metallic plate of the upper extremity of the pile. The vibration of light, however, is particularly strong on applying one wire on a spot above the eye-brow that has been previously deprived of its epidermis, and on putting the other wire into the nose or mouth; as the flashes of lightning and the strokes, which then extend themselves through the whole head, are frequently so violent and stupefying, as to cause lipothymies, when the pile consists of twenty or thirty strata. The other organs of sense are likewise evidently affected from Galvanism by means of Volta's pile. On bringing, for instance, the wire *a*, fig. 1 (Pl. V.), into the ear that has been previously moistened, whilst the other wire, *b*, fig. 1, is held by the hand in a glass of water, a stroke and a strong sound will be perceived in the ear, which becomes more benumbed if the wire *b* is taken out of the water and applied to the other ear, so as to bring both into the connection of the chains. On twisting wire about the ears, moistened with salt water, so that the ends of the wire can be immersed into glasses of water, in which the chains fastened at the extremities of the pile are placed, a giddiness is occasioned, and most beautiful flashes of lightning will be seen. The sensations of sound, however, and tingling in the ear, become particularly strong when we put a conductor applied to the Eustachian tube in combination with a chain. On dipping a finger into one of the above glasses, and into the other a zinc bar, and touching this with the tongue, insupportable pains will be felt, a flash of lightning be seen, and a singular sourish taste remain some time after. These phenomena, however, are found to differ remarkably by the manner in which the chains are touched, whether by the silver side or

by the zinc side of the pile, or whether they are connected or separated; because, in case of either shutting or disuniting the chains, the feelings arising from the silver side and that from the zinc side are always opposite to one another, and what is most curious, the sensation which is occasioned on shutting the chains at the silver side is exactly the same as the zinc side, when the chains are disjoined, while the feeling at the silver side changes into that which was perceived on the zinc side when the chains were shut, and *vice versa*. Thus, for instance, in the strokes perceived in the fingers, the finger at the zinc wire *b*, of Volta's pile, feels a sensation as if a string was tied round it, whereas a disagreeable pungent feeling passes through the finger at the silver wire from the point of contact in all directions; but on disjoining the chain this sensation changes, so that what the finger at the silver wire felt, is then felt by the finger of the zinc wire, and *vice versa*. When the circle or chain is formed, by means of the tongue, by bringing it into contact with the silver wire *b*, fig. 1, of the battery, whilst one end is applied to the zinc wire, a very strong shock will be perceived in the tongue, from which an impression remains at the spot where the shock took place. On forming the chain with the tongue, applied at the silver side, a very disagreeable shock is produced, which leaves behind it a feeling as if a hole was struck into the tongue. When the tongue is brought into contact with the zinc side, and the circle formed by another part of the body, a sensation of heat will be felt, together with the shock and the fourish taste, which, however, on disjoining the chains, is changed into the opposite sensation of cold, and *vice versa*, when the tongue is in contact with the silver side. The sensations produced in the nose differ likewise according to the manner of applying the wire; when we apply the silver wire, an inclination to sneeze will arise, which is not the case with the zinc wire. On bringing the ear in contact with the zinc side of the battery, a clear sound is perceived, which becomes stronger when the ear is brought in contact with the silver side. The phenomena produced in the eyes differ also according to the different manner in which the eye is brought in contact with Volta's pile."

From these statements it appears, how much the medical use of Galvanism deserves to be recommended, and that, notwithstanding the few practical observations which have hitherto been made on that subject, we are entitled to expect no inconsiderable advantages from so powerful and penetrating a stimulus. In employing it, however, for the cure of diseases, we should always consider the topical as well as the general state of irritability, in order to prevent any bad consequences which may arise by applying too strong a degree of this stimulus. A strong Galvanic shock generally occasions lassitude and a kind of lameness, which continues for a whole day, particularly if we have for any long time exposed our

selves to the action of the battery. Thus, Mr. Rutter, a gentleman to whose ingenious experiments we are particularly indebted for many interesting explanations with respect to this subject, felt a general indisposition, attended with weariness and dulness in the head, after having exposed himself for a whole hour to the action of a strong battery, which consisted of 100 strata. Inflammations of the eyes after continued experiments with light, debilitated insensibility of the tongue, catarrhs after frequent experiments in the nose, vertigo and head-ach after violent strokes through the head, and tooth-ach, which always ensue after any experiment being for some time continued at any of the above parts of the head, are the common consequences of Galvanising, which undoubtedly arise from this stimulus having acted too violently on the healthy degree of irritability. In diseases, therefore, where a great irritability prevails, attended with debility, we ought only to employ it in a weak degree; but in paralyzes from indirect debility, we may immediately begin with violent commotions. Regard should also be had to the organ on which we intend to act. The weakest degree of Galvanism is produced by means of two small metallic plates, which are placed near each other on any part of the body, that has been previously deprived of its epidermis.—The diseases in which it is supposed the application of Galvanism may be attended with success, are the following:

1. *Asphyxia and apparent death.* Mr. Creve has already recommended, as the surest method of examining the real or apparent death of a person, to apply one branch of an arch, consisting of two metals, to a brachial nerve, previously laid bare, and the other branch on a neighbouring muscle, in order to excite powerfully by this simple Galvanic chain the debilitated irritability. The coating of the nerve, however, being not necessary, as a slight wound of the skin is sufficient for admitting the action of Galvanism, small incisions made with a scarificator will fully answer the above purpose. To these incisions the Galvanic power is to be led by means of the two conductors *c c*, fig. 1, which must be applied at a small distance from one another. On perceiving convulsions, we may conclude that there is still incitability left in the body; but when no commotions are produced by the strongest Volta's pile, a total want of vital power must be supposed, provided the battery is in such a state as to shew itself perfectly efficacious. The same method may be observed in asphyxia; we ought, however, always to begin with a few strata, and to increase them by degrees with great precaution, for fear of extinguishing the small quantity of vital power that may be still existent. For this purpose, Volta's battery seems to be far better calculated than any other manner of applying electricity, because the necessary degree of stimulus can be easier adapted to the degree of incitation by Volta's pile; besides, its constituent parts are more portable than an electrical machine.

2. *Paralyses.* Under this great class of nervous diseases, we can only comprehend such as do not arise from organic defects, as, a pressure of the nerve, a luxation of the vertebræ lumbares, or a kyphosis, but which originate in an internal indisposition of the nerves; whence, for instance, the common hemiplegies from indirect asthenia and any topical debility or inactivity of the nervous system. In order to apply the Galvanism in a paralysis of the extremities, two small spots above the place where the nerve runs, viz. at the thigh above the ischiatic nerve, and at the arm above the nervus cutaneus externus, are deprived of their epidermis; and when they are sufficiently moistened, the Galvanism of Volta's battery is conducted to them by means of the two chains *ab*, and the conductor *cc*, which must be taken by the glass tube and moved on the excoriated places. When the paralysis is attended with a high degree of insensibility, or a total loss of motion as well as sensation, the Galvanism should be applied in a strong degree, in order to excite the nervous power, and to accelerate the process of life by this new and penetrating stimulus; which being done, the number of strata must be afterwards diminished, so that by degrees a less degree of this stimulus acts with the same force as a greater one did before. By observing this rule, we succeeded some time ago in restoring sensation perfectly, and motion for the most part, with causing at first strong commotions by a battery of sixty strata in a hemiplegia from indirect debility, attended with total insensibility, in a patient sixty-six years of age; but as the limb was vehemently convulsed, and became so painful to the patient, that she refused a continuation of these experiments, the cure could not be performed merely by Galvanism, but recourse was had to the use of other excitant remedies.

3. *Nervous diseases from direct asthenia*, in which the irritability is so much accumulated, that all stimuli produce too violent and preternatural sensations: of this kind are spasms, convulsions, chorea St. Viti, but particularly trismus and tetanus. The first application of a powerful stimulus ought naturally to be weak in these diseases, and which is to be done by means of two different metallic plates, which being fastened to a leather strap, are applied at two places, and brought into contact with each other by means of the conducting arch, fig. 4. These places, however, must have been previously excoriated by blisters, or wounded by the scarificator. When no effect ensues on the application of these single plates, we ought to combine them with one another, and thus increase by degrees the number of strata and the force of Galvanism. By immediately beginning with strong Galvanic shocks in these directly asthenic diseases, we might probably do more harm than good; and violent pains and convulsions have arisen from the application of a strong Galvanic battery with forty or fifty strata, in

a patient affected with a continual motion and a great sensibility of the lower extremities; whereas the use of Galvanism, from a few strata, seemed perfectly to agree with him. The application of this stimulus in cases of trismus and tetanus has not yet occurred to us; but it may be supposed, in all probability, that those diseases arising from a total torpor in the muscles, which originates in the nerves, may be removed by a stimulus that shews itself so powerful in similar affections. We should, however, think it advisable, in this case, to increase the force of the battery more suddenly.

4. *Weakness of sight and amaurosis.* Galvanism must be employed here with the utmost precaution, particularly in the first case. One of the chains, fig. 1, *b*, being placed in a glass of water, the patient is ordered to hold his hand in it, while the conductor of the chain, *a*, is applied to the eye-lid, which must be previously moistened. The flashes of lightning which then appear, become stronger or weaker according to the number of strata of which the battery consists; but we should begin with a few strata, and only increase them by degrees. In a perfect amaurosis, however, we should use a more violent degree of Galvanism; to which end a blister being applied above the eye-brows of the diseased eye, near the glabella, the patient is ordered to put a wire, fig. 1, *b*, into the mouth or the nose at the side of the diseased eye, and the conductor of the chain, fig. 1, *a*, is then brought in contact with the place deprived of its epidermis by means of the blister. For the beginning, ten strata are sufficient, which may be afterwards increased. Patience and perseverance are required for performing such a cure. Dr. A. succeeded in this case, though not till after an experiment eight times repeated, in producing some change in the diseased eye: for after having increased the strata to thirty-five, at the ninth experiment a slight glance of light was produced, which was slowly augmented. He has not experienced any quicker effect of Galvanism in amaurosis, and is therefore inclined to think the accounts of amaurosis being cured by Galvanism in a short space of time exaggerated, though it may prove of quicker and better effect in the beginning of an amaurosis. There is, however, a kind of amaurosis, which originates from a congestion of blood towards the head, where Galvanism is by no means indicated, but where topical venæsection, foot-baths, and the application of cold water on the eye, are of the best service.

5. *Difficulty of hearing and deafness.* As these affections arise from different causes, in which Galvanism is of no use, we can only expect advantage in those cases where a paralysis of the acoustic nerve is to be removed, and perhaps also where the secretion of the ear-wax is to be promoted. In total deafness from a paralytic state of the acoustic nerve, we use immediately in the beginning a battery of twenty or thirty strata; but in difficulty of hear-

ing, a less degree of Galvanism is to be applied. The best mode of application in the above affections is the following: A place behind each ear, on the processus mastoideus, being deprived of its epidermis, a zinc plate is applied on one side, and a silver plate on the other, by means of the bandage represented in fig. 5. This bandage consists of a hoop of whalebone, which is fastened by means of a cap round the occiput, and of a ribband tied under the chin; on the two ends of this hoop we can screw the plates, fig. 5, *a*, which being brought in combination by means of a silver chain, are suffered to lie for several days: a humming sound arises now in both ears, and an acrid serum issues from the sore places, particularly from that touched by the zinc plate, which strongly calcines, and on account of its violent effect must be frequently changed with the silver plate. This mode of applying a simple Galvanic chain is frequently efficient enough, as a powerful stimulus, in deafness from metastases of a morbid matter, and in that kind of difficult hearing which arises from a dryness of the internal surface of the tympanum, to be distinguished by the patient's hearing better through the mouth than through the auditory canal, and by the dryness of the membrana pituitosa of the nose. In that kind of deafness, however, which is attended with a want of the ear wax, it is rather advisable to bring the conductors of Volta's battery, fig. 1, *c c*, into the auditory canal, which must be previously moistened; for this purpose we can make use of the apparatus, fig. 5, *b*, consisting of a brass cylinder or nut, fig. 5, *b*, over which the conductor is moved into the ear as far as we think proper. The strongest action of Galvanism, on the organ of hearing, is produced by bringing a curved wire, fig. 6, into the Eustachian tube, which being put in connection with one chain, the patient is ordered to hold the other in the wet hand.

6. *Aphonia and hoarseness.* These affections may also originate from different organic lesions, viz. abscession of the nervus recurrens, &c. in which Galvanism is of no service; but where obstructions in the glands and a paralysis of the above nerve, or of the muscles of the tongue, take place, it proves undoubtedly of great effect. To this end a leather strap, fig. 3, may be used, by means of which the zinc and silver plates are fastened on two spots, deprived of their epidermis, above the musculus sternocleidomastoideus, near the larynx: the plates are brought into connection by the conducting metallic arch, fig. 4, which can be widened and shut at *a*. The effect of Galvanism may be increased by applying the two conductors, fig. 1, *c c*, Dr. Grapengieffer succeeded in this manner in removing, in the space of twenty-four hours, an aphonia that had lasted ten years.

7. *Chronic rheumatism with rigidity of the limbs and joints.*

8. *Cold swellings and asthenic inflammations.*

9. *Tooth-ach.*

10. *Oedema and dropsy*; in which the activity of the absorbent vessels is to be restored or increased.

On the whole, we may avail ourselves of Galvanism in any asthenic disease; but we should always regard the difference between direct and indirect asthenia, if we intend to do any good by the application of that powerful stimulus.

The following is a connected explanation of the GALVANIC APPARATUS exhibited in the plate:

Fig. 1. Volta's battery between four glass pillars, with the discharging chains, *a b*, and the conductors, *c c*, fastened to them, which consist of wires passing through glass tubes.

Fig. 2. One of the brass plates, which are placed one on, and the other under, the pillars, and to which the chains, *a b*, fig. 1. are fastened.

Fig. 3. Two metallic plates, the one of zinc the other of silver, which are fastened by buttons in a leather strap; to be applied in aphonia and hoarseness.

Fig. 4. The conducting arch, by means of which the connection between the two plates is formed.

Fig. 5. A bandage for the head, for the application of Galvanism in cases of deafness, consisting of a piece of whalebone to pass over the back of the head, which is to be fastened by a cap on the head and a band under the throat; to the two ends of which two plates of different metal can be screwed, over the processus mastoideus, and the apparatus above described.

Fig. 6. An insulating wire passing through a glass tube, the upper end of which is provided with a button, and consists of fine steel, in order to bring it conveniently into the Eustachian tube.

OF NEW INSTRUMENTS FOR SURGICAL OPERATIONS, &c.

In the foregoing sheets mention has occasionally been made of new or improved instruments employed in surgery; but as some of these still remain to be noticed, we close the present volume with the accounts given of them by their different inventors and recommenders.

1. *For Lithotomy.*] In the Medical and Physical Journal (a work to which we have many obligations, particularly for the delineations now to be spoken of), Mr. Carlisle, surgeon to the Westminster hospital, gives the following account of an instrument used in cutting for the stone, by M. Delfault, and which, from his own experience, he is disposed to recommend.

"The various alterations," says Mr. Carlisle, "which eminent Lithotomists had given to the gorget, made me suspect the fitness of that instrument for its destination. The operations on the dead

subjects still more encouraged my suspicions. The conical gorgets were almost abandoned; and the tearing effects produced by them, were found to be sufficient objections among junior practitioners. The form and extent of the cutting edge of the improved gorgets are adapted to the taste of each operator. The obliquity of the angle, formed by the cutting end of the gorget with its barrel, has been also a subject of much variety. It would be very unprofitable, at this day, to enter into a history of the various modes in which lithotomy has been performed, or the tools with which the operators have executed their work. Much experience has been already recorded, improvements have gradually been made, and we look back with thankfulness on those who have contributed to the preservation of human life, and with hope to those who may still assist in the alleviation of misery. It appears to me, that one very desirable point in the operation of lithotomy, is to make a rapid and clean cut opening into the bladder. The gorget, with an edge at nearly right angles with the grooved part, is pushed through the bulbous portion of the urethra, the surrounding cellular substance, prostate gland, and whatever portion of the bladder may be cut, with a direction of force like that of digging with a spade. If the patient should be emaciated, and the surrounding cellular substance loose in its texture, the bladder may be pushed beyond the end of the staff before the tougher part gives way, and thus both apparatus slip between the bladder and rectum. I think that I have seen this happen under a skilful hand. If the mechanical push required be considerable, the beak of the gorget is kept in the groove of the staff with difficulty and uncertainty. When a gorget with a cutting edge at a more acute angle is used, there is danger of the point reaching the furthest side of the bladder, before the shoulder gets in; or, as has really happened, it may suddenly slip by the unforeseen yielding of the parts, and pass through the back of the bladder into the rectum. It seems convincing to my mind, that these dangers and difficulties are removed by using the *Bistoiré Caché*. The operation being conducted in the usual manner, and the groove of the staff laid bare, this instrument is made to slide into the bladder, without either cutting or tearing. When the staff is withdrawn, the operator can measure the distance of the bladder, by feeling its posterior surface; and pulling out a little, so that his knife shall clear that surface, he executes the dark and dangerous part of this operation by a clean drawing cut. The same parts are necessarily divided in this method as when the gorget is used, and no more. The advantages of it are derived from the certainty of the opening into the bladder, and of the parts remaining in their places suffering only a simple incision."

This instrument is represented in Pl. VII. and the following is a description of its different parts:

Fig. I. Is the complete instrument.

A. The wooden handle, carved, to secure it from slipping.

B. A screw, whose head is the prop of the lever D, attached to the cutting blade; and by raising or depressing this screw, the knife is made to gape at such a distance from the sheath as may suit the age, &c. of the patient.

C. A spring which presses the lever D, outwards, keeping the blade within its sheath.

D. The lever alluded to.

Fig. II. The lever and cutting blade separated from the handle and sheath.

A. A rounded and probe-pointed termination given to the cutting blade, for the purpose of avoiding any end-laceration.

Fig. III. The complete instrument, having the blade exposed, by representing the lever depressed.

To this account immediately succeeds a description of a new instrument for operating for the stone, by Mr. Robert Watt, surgeon, in Paisley, who speaks of it in these words:

"In every operation, our chief object should be, to avoid every possibility of danger, and to render it as little painful to the patient as possible. In operating for the stone with the common instruments, the danger and pains are both very considerable: there is a danger of the beak of the gorget getting out of the groove of the staff, and injuring the parts, which may endanger the patient's life. This accident has frequently happened, not only to new beginners, but also to some who have previously operated with success. Though we should enter the bladder in the very place where we wish, still there is a danger of wounding its back or fundus, if the instrument is not immediately withdrawn before the urine be discharged, and the bladder begins to contract: this may, in some measure, be prevented by the double gorget proposed by Dr. Monro, and improved by Dr. Jeffery. The addition, however, renders the instrument bulky, and more difficult to be introduced.

"It sometimes happens too, that the bladder is so contracted by the irritation of the stone, that it can neither be distended by the urine, nor any other means we can use. In such cases, where the fundus has fallen down to the sphincter, there is scarce a possibility of operating with any of the common instruments, without making an incision in the one as well as the other. The instrument proposed by *Frère Cosmé*, would, in such cases, upon entering through the sphincter of the bladder, carry the fundus before them in such a manner, that the knife, when raised out of the groove, would infallibly make an incision in it.

"These difficulties seem, in some measure, to be removed by the instrument now proposed (see Pl. VII.); the manner of operating with which is as follows: Having introduced the staff, and

made an incision upon it, through the membranous part of the urethra, as is done in performing the lateral operation, the instrument, with the cutting part concealed, is introduced along the groove of the staff, till it has fairly entered the bladder; the staff may now be withdrawn, and the stone being distinctly felt by the end of the instrument, the thumb is applied to the button, and pressed forward, gradually raising the cutting part out of the groove till it assume the form of fig. 5. The edge being now in the proper direction, we withdraw the whole instrument, and an opening is made, equal to the distance from M to N, fig. 5, which can be made greater or lesser, according as we expect a large or small stone, or according to the age of the patient.

“With this instrument, although the fundus of the bladder should be fallen down to the sphincter, there will be little danger of its being wounded. For the instrument, with the cutting part concealed, being introduced two or three inches within the sphincter, according to the size of the bladder, the prop rising gradually out of the groove till it comes to a right angle with the stem, effectually removes any part of the bladder which may be lying along the side of the instrument; a circumstance which renders it greatly superior to that of *Frère Cosmé*. In his, the cutting part goes nearly as far forward as the end of the stem, so that upon raising the knife out of the groove, every thing along the side of the instrument must inevitably be cut through; whereas, in the one now proposed, the cutting part, when it begins to rise out of the groove, is at least an inch, or an inch and a quarter, behind the end of the stem.

“Another and very important advantage attending this instrument is, that it cuts easier than the cutting director, or common gorget. It often happens, that a considerable degree of force must be applied, in order to run the gorget forward into the bladder; and owing to its elasticity, it flies before the edge of the instrument, so that a fair incision can scarcely be made: whereas, by evolving the instrument within the bladder, and drawing it out, an incision can be made with the greatest ease. Having once felt the stone with the point of the instrument, and elevated the blade, all we have to do, is to cut what is between it and the outside, so that a mistake can scarcely happen. Here it is impossible for the bladder, as in the other case, to recede by its elasticity from the edge of the instrument, or the instrument to miss the bladder, or wound it in a wrong place. In this part of the operation with the common gorget, we are working very much in the dark. From our knowledge of the anatomy of the parts, we flatter ourselves, that it is impossible we can go wrong; but still the fatal blunders which are daily committed, shew us how far we are mistaken.

“In some cases, after the incision is made with the gorget into the bladder, the stone being considerably larger than we expected,

hence we find it impossible to contract it, without either lacerating the parts, or enlarging the wound by a second incision; the former ought undoubtedly to be avoided, and the latter can scarcely be accomplished with safety, by any of the common instruments. For, after an effort has been made to extract the stone, the bladder contracts so closely, that the incision cannot be enlarged, either with a scalpel or gorget, without cutting through both its sides. This, however, may be done with the instrument now proposed, by introducing one of a larger size, with the cutting part concealed two or three inches within the sphincter, as at first; then reaching forward the fore finger of the left hand to guard the edge, till it reach the external angle of the first incision; then withdrawing the whole, the wound will be enlarged equal to the difference between M, N, in the two instruments.

“I may observe, that if this instrument, upon further trial, shall be found to answer the purpose as well upon the living subject as it has been found to do upon the dead, it will render the operation safe, and the apparatus extremely simple. In operating upon the female, nothing further will be necessary than a pair of forceps to extract the stone. Upon the male, a staff, a scalpel, and a pair of forceps, will form the whole apparatus. Nothing enhances the value of an instrument so much as the simplicity of its construction, and the ease and safety with which it can be used. These were the objects I had in view; how far I have succeeded, experience only can determine.”

The following is an explanation of the figures in Pl. VII.

Fig. IV. represents the instrument of a middle size, with the prop and cutting part concealed in the groove A. D, a plate of steel continued from the end of the stem B, covering the wooden part of the handle E. The handle would perhaps answer the purpose much better, were it a little longer than it is here represented. Fig. II. gives a front view, having the button C pressed forward to K, by which the blade F, and prop P, are elevated out of the groove, and in the position in which they should be, when the operator withdraws the instrument from the bladder. M, a screw, which being taken out, and the button C screwed off the prop and blade, may be withdrawn from the groove and cleaned. Fig. VI. represents the prop, cutting part, and wire, taken out from the instrument. By making the joint G with a small screw, and having two or three props of different lengths, the same instrument will then serve to make a large or a small incision, as the case may require. Fig. VII. the button screwed off from the end of the wire O. This ought to be made hollow upon the outside, with rough edges, so that the thumb of the operator may not readily slip off.

Mr. Watt says, “I have sometimes thought, that a small spiral spring within the instrument at B, might be of service. It would slightly resist the pressure of the thumb, when applied to the button,

by which means the cutting part could be more steadily elevated ; and when the thumb was removed, it would replace the whole in their former position. Owing, however, to the smallness of the tube at B, the maker would perhaps find it difficult to give it this addition."

2. *For the fistula in ano.*] The following description of a new instrument for performing the operation for the fistula in ano, is given by Mr. WHATELY, surgeon, in London.

"Simplicity of construction," says he, "is certainly a great recommendation to all instruments employed in surgical operations. We are not, however, to give the preference to any merely on account of their simplicity, as it may happen that the more complex may sometimes be better calculated to perform the operation in a proper manner ; this is the case with Pott's instruments for performing the operation for the radical cure of the hydrocele, which I know, from experience, answer better than the more simple Seton's lancet used by Mr. Hunter for the same purpose.

"The ingenuity of artists has been frequently exercised in contriving an eligible instrument for cutting for the fistula in ano ; an operation which consists in dividing a portion of the rectum and of the adipose membrane and the sphincter ani, so as to lay open the sinus or sinuses which constitute the disease. If these sinuses are not completely laid open, or if the division be made in an improper place, the first operation sometimes fails of making a perfect cure. Any of the instruments which have been made for this purpose may answer the intention in particular cases very well ; but the blunt-pointed crooked bistoury, recommended by that excellent surgeon Mr. Pott, certainly has the pre-eminence, and when the operation is performed after the recent bursting of abscesses in these parts, or where the external orifice is open enough to admit readily the passage of the knife, there is perhaps no instrument more eligible.

"There are, however, many cases of fistula in ano, in which I think a better instrument may be used. It frequently happens in those of long standing (which oftener come under the operator's care than the more recent ones), that the external orifice is very small ; sometimes scarcely large enough to receive the point of a common probe. In some of these cases, the fistulous cavity leading to the gut may be easily traced by a probe. In others, either on account of small windings in the cavity, or from other obstructions which the probe meets with in exploring it, a little time is required in the examination, in order to ascertain the direction and extent of the sinus ; and whether it communicates with the cavity of the rectum by a direct opening through the gut, or runs on its outside only, without such a communication with its cavity. When the external orifice of the fistula is very small, it will not be possible in some cases, especially where a patient is timid, to pass the probe-pointed knife so as to meet the finger, without its

wounding more or less some of the parts in its passage. If the true direction of the sinus be not followed after the introduction of the knife, it must be apparent to every one, that it cannot be explored without giving much unnecessary pain, by an instrument that is liable to cut. And although it may not be difficult to push the instrument within the cavity of the rectum, so as to meet the operator's finger, yet it appears highly probable that this perforation may sometimes be made in a different part to that which was intended; an error which may occasion a failure in the cure. Sometimes we find the orifice of the fistula situated upon the buttocks, at the distance of three or four inches from the anus: in this case, the external sinus must be in part opened by the knife, before the probe point of it can possibly reach the operator's finger; and this may occasion some difficulty in finding the true direction of the sinus.

“ These circumstances led me to adopt a new instrument, which is the subject of this paper. This instrument consists of a very narrow probe-pointed curved knife *, with a ring affixed to its handle (Pl. VII. fig. 1), and a sheath on its blade, having a screw fixed to one end of it, to confine the knife and the sheath together (fig. 2). By the handle of this screw, the operator's assistant may draw off the sheath from the knife. At the point of the sheath there is a very fine division in its central part, to the extent of a quarter of an inch, in order to prevent the edge of the knife being injured in withdrawing it. While both parts are fixed together, they make a perfectly smooth and uniform instrument, not unlike a curved probe (fig. 3). This instrument may be introduced into any fistulous orifice that will admit a common probe; and may be easily passed along the cavity with one hand, while its point is received by the fore-finger of the other hand, thrust into the anus, in those cases where the gut is perforated by the disease. Where it is not perforated, this instrument, by means of the fore-finger in its ring, can be very easily pushed through it, as Mr. Pott justly observes may be done in a like situation with the probe-pointed knife. At this stage of the operation, the sheath may be set at liberty in a moment by an assistant; after making a single turn of the screw, he may instantly, by its handle, withdraw the sheath from the knife. The surgeon directly afterwards finishes the operation by dividing the gut, as with the probe-pointed knife.

“ With this instrument (made within the last two months by Mr. Evans, in a very neat manner) I have performed the opera-

* This instrument may likewise be made perfectly straight. In this form it will answer extremely well, where the gut is to be slit not much above the sphincter; but where this is to be done nearly to the extent of the fore-finger, as will be necessary in some cases, a straight line will, without great care, be apt to cut the operator's finger. It may also be made of any degree of curvature, or with a handle, of any shape or size, instead of the ring.

tion much to my satisfaction in five different subjects; the last of whom declares, that the whole operation gave him much less pain than the previous examination of the sinus by the probe.

3. *For drawing teeth.*—When speaking of diseases of the teeth, we took occasion to describe an instrument for drawing teeth recommended by Dr. Dyce. The following is an account given in the Medical and Physical Journal, of an instrument for the same purpose, invented by Mr. Reece, a practitioner in London. Of this, which he calls his “Odontagra” he speaks in the following terms:

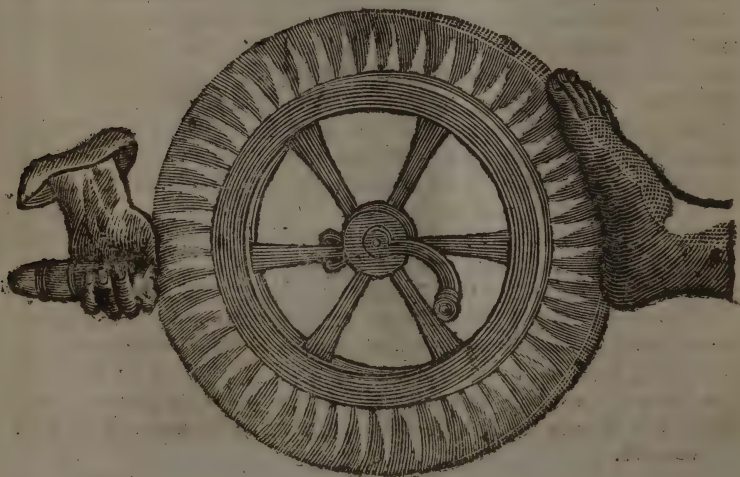
“The principal objects to accomplish in this invention, are, 1st. To extract the tooth in as perpendicular a direction as possible, which is nearly effected by the curve of the claw A (Pl. VI.), being more than a semicircle. 2dly. To prevent the breaking of the tooth, and facilitate its extraction, the end of the claw B is a little reflected, that it may be introduced between the scarified gum and tooth, as far down as the alveolar process will admit of, and press on a greater portion of the tooth. 3dly. To avoid the great pain and injury of the gums from pressure by the structure of the fulcrum C [which rotates on either side, on the shank (G)]. In the upper part, is a concavity to receive the tooth opposite the upper part of the reflected end of the claw, and the pressure of the gum portion E does not fall on the contiguous soft parts till the tooth is a little elevated, which afterwards, for its complete expulsion, is very trifling. 4thly. To prevent the claw slipping in the operation, by the spring F, and which, on taking firm hold of the tooth, so as to be withdrawn, is fixed between the fulcrum and claw, rendering a further use of the scarificator and forceps unnecessary, which so often alarm the patient with the idea of a second operation.

“When the caries of a tooth has gone to that extent, as to leave only a bare shell on one side, or the whole corona is destroyed, so that the remains are level with the gum, the polished part of the fulcrum must of course rest on the gum; but from the absorption of the alveolar process, and the loose connection of the fangs with the socket from the same process, the force required for their expulsion is attended with neither pain nor mischief; and from the formation of the end of the claw, performed with greater ease than the usual way of *punching*.

“It is, I think, much to be lamented, that the operation of tooth-drawing should be deemed by the Faculty of so little importance, as to be left to the practice of people both ignorant of its nature and structure of the parts, notwithstanding the frequent occurrence of ill effects from the rude and unscientific removal of teeth; besides, I conceive it often a nice question in surgery, to determine whether the extraction of the tooth be absolutely necessary. A case some time since occurred in Monmouthshire, of

a lady who fell a sacrifice to inflammation arising from the irritation of a tooth. Soon after she found it painful, she sent for a surgeon to extract it, which, on account of the contiguous soft parts being much inflamed, he postponed till the next morning, recommending in the interim, proper means to be taken for its resolution. In the course of the night this unfortunately increased, and on the following morning rendered the operation still more objectionable. On the third morning, the inflammation had extended to the œsophagus and neck, so as to prevent deglutition; and on the 5th, it had spread to the breasts, which were amazingly tumefied. About the 9th, a very extensive suppuration took place. About the 11th, it assumed a gangrenous appearance, which soon terminated in mortification, in spite of the efforts of her medical attendants, who are very deservedly esteemed gentlemen of great professional judgment and skill."

4. The *metallic brush*.]—Mr. Molwitz, of Stuttgart, describes a new instrument, which he calls the Metallic Brush, and from which, full as good effects may be expected as from Perkins's metallic tractors. He is however of opinion, that the action of both instruments is merely mechanical, but he particularly recommends his Metallic Brush, as uniting all the different effects of mechanical stimuli, as that of friction, pressure, flagellation, brushing, &c. This instrument consists of a small wheel, about one foot in diameter, made of any light wood, which has on its right a handle for turning it, and on its left a wooden handle for the left hand, at which it moves through the medium of an iron axle. On its periphery, which is about one inch and a half broad, are fastened bunches of wire, two or three inches long, the tops of which end in small knobs, like the heads of pins. Nothing material consists in the size of the knobs, or the length of the wire, nor in the direction of the bunches..



This cheap and simple instrument may be applied either by the patient himself in some places, or by somebody else, without requiring any particular dexterity, and it is said to afford the following advantages. 1. During the operation the instrument as well as the part on which it is applied can be moved in different directions, and each place touched in such a manner as answers the purpose. 2. According to some observations, the application of it on the surface of the belly, seems to promote the peristaltic motion, and to excite the stomach and bowels to digestion, and extraction of the chyle, and likewise to carry off wind, and forward the excretion of fæces. 3. The insensible perspiration is greatly promoted by it, and on that account its application on the whole surface of the skin may prove very useful in diseases that arise from a suppressed transpiration. Mr. Molwitz knew an instance of a retrograde erysipelas being re-produced on the skin by the use of the Metallic Brush. He also relates another case, where an aged man, who suffered severely by rheumatic pains on several parts of the body, was cured by four applications of that instrument. As the patient was so extremely sensible at the affected places, it could at the first time be only applied in circular motions round the affected parts; but the second time he could bear the immediate touch of the instrument on the suffering parts. 4. This operation seems to have a considerable influence on animal heat, and the circulation of the blood, as it causes a quicker pulse, and a congestion from the whole system of blood vessels towards the parts that are touched with it. 5. The absorption is thereby considerably supported and increased. Mr. Molwitz relates an instance of a considerable extravasation of blood, occasioned by a fall, being removed by it in a very short time, without the application of any other remedy. 6. Mr. Molwitz thinks, that it might likewise be of great use in obstructions and spasms of the belly, caused by a sedentary life; and he mentions a case of a painful spasmodic sensation in the stomach of a woman being cured by it, when the patient could not bear any internal medicine. The operation ought to begin gently, and the instrument first conducted round the affected part, approaching by degrees towards it; and lastly, it is not to be applied too long upon the same part.

EXPLANATION OF THE PLATES.

PLATE. I.

- Fig. 1. A lancet and canula for discharging the contents of an abscess by means of a seton.
- Fig. 2. A director for guiding the knife in discharging the contents of an abscess, &c.
- Fig. 3. A pair of forceps for extracting polypi.
- Fig. 4. A slit probe for conducting a ligature to the root of a polypus.
- Fig. 5. A ring probe for assisting in securing a ligature upon the root of a polypus.
- Fig. 6. A double canula for fixing a ligature upon the root of a polypus.
- Fig. 7. A bandage for making compression after performing the operation of arteriotomy at the temples.
- Fig. 8. A seton needle.
- Fig. 9. *a, b*, Two pins of different forms used in the twisted or hare-lip future. The first commonly made of silver, with a moveable steel point; the other of gold.
- Fig. 10. The tourniquet now most generally used.
- Fig. 11. The tenaculum used in drawing out the mouths of bleeding vessels, for the purpose of securing them by ligature.
- Fig. 12. A blunt-pointed bistoury.
- Fig. 13. A raspatory for removing the pericranium in the operation of the trepan.
- Fig. 14. The trephine, with all its parts connected and ready for use. *a*, the centre-pin, which can be raised or depressed by the slider *b*. *c*, the part where the saw is united to the handle by means of the spring *d*.
- Fig. 15. A brush for cleaning the teeth of the saw.
- Fig. 16. Forceps for removing the piece of bone when nearly cut through by the trephine or the trepan.
- Fig. 17. A levator also employed in removing the piece of bone.
- Fig. 18. A lenticular for smoothing the ragged edge of the perforated bone.
- Fig. 19. A speculum used for keeping the eye-lids separated, and the eye fixed, in performing various operations upon that organ.
- Fig. 20. A flat curved hook for elevating the upper eye-lid, and fixing the eye, in performing various minute operations upon its surface.

- Fig. 21. A couching needle.
 Fig. 22. A couching needle for the right eye, fitted for the operator's right hand.
 Fig. 23. A knife for extracting the cataract.
 Fig. 24. A flat probe for scratching the capsule in extracting the crystalline lens.
 Fig. 25. A flat probe or scoop for assisting in removing the cataract.
 Fig. 26. A knife for extracting the cataract from the right eye.
 Fig. 27. One of Anel's probes for removing obstructions of the lachrymal duct.
 Fig. 28. A syringe and pipe (by the same) for injecting a liquid into the lachrymal duct.
 Fig. 29. A crooked pipe which fits the syringe.

PLATE II.

- Fig. 30. An instrument for compressing the lachrymal sac.
 Fig. 31. A trocar and canula for perforating the os unguis in the operation for the fistula lachrymalis.
 Fig. 32, 33, 34. Instruments employed by Mr. Pellier in the operation for fistula lachrymalis. Fig. 32, a conductor for clearing the nasal duct. Fig. 33, a conical tube to be left in the duct. Fig. 34, a compressor for fixing the tube in its place.
 Fig. 35. A trocar for making an artificial parotid duct.
 Fig. 36. Forceps sometimes used for laying hold of the lip in the operation for the hare-lip.
 Fig. 37. Pins used in the operation for hare-lip, represented as they are usually inserted into the part.
 Fig. 38. A gum lancet.
 Fig. 39. A trocar for perforating the antrum maxillare.
 Fig. 40. An instrument of a tubular form for the same purpose.
 Fig. 41. No. 1, 2, 3, 4, 5. 1, a file for removing inequalities upon the teeth. 2, 3, 4, 5, different forms of instruments for removing tartar, &c. from the teeth.
 Fig. 42. No. 1, 2, 3. 1, 2, instruments for stuffing gold-leaf, &c. into a hollow tooth. 3, the handle which fits them all.
 Fig. 43. Forceps for extracting teeth.
 Fig. 44. A punch or lever for extracting stumps of teeth.
 Fig. 45. Mr. Cheselden's needle, with an eye near the point, for tying a knot on scirrhus tonsils.
 Fig. 46. A speculum oris first proposed by Mr. B. Bell.
 Fig. 47. A scarificator for scarifying the amygdalæ, and for opening abscesses in the throat.
 Fig. 48. Forceps for extracting extraneous substances from the outer passage of the ear.

- Fig. 49. An instrument used for concentrating sound in cases of deafness.
- Fig. 50. A tube by which the Eustachian tube may be washed in certain cases of deafness.
- Fig. 51. An instrument for perforating the lobes of the ear.
- Fig. 52. An instrument recommended by Mr. B. Bell for supporting the head after the operation for wry-neck.
- Fig. 53. An instrument, invented by Dr. Monro, for fixing the canula after the operation of bronchotomy.
- Fig. 54. A syringe for injecting the outer passage of the ear.
- Fig. 55. A silver canula for carrying off pus collected in the thorax.
- Fig. 56. Mr. André's lancet-pointed trocar, the canula of which is made of two hollow plates of steel screwed together at the larger extremity.
- Fig. 57. A director used in the operation for the strangulated hernia.
- Fig. 58. A spring truss for an inguinal or femoral hernia of one side only.
- Fig. 59. A spring truss for an inguinal or femoral hernia existing on both sides.
- Fig. 60. A spring truss for an umbilical hernia.
- Fig. 61. Mr. André's trocar for evacuating the contents of an encysted hydrocele.
- Fig. 62. Mr. B. Bell's trocar for operating in the hydrocele.
- Fig. 63. A bag of *resina elastica*, with a stop-cock and short pipe, which fits the canula of the trocars fig. 77, 78, for the purpose of injecting the cavity of the tunica vaginalis in the case of hydrocele.

PLATE III.

- Fig. 64. A straight-edged bistoury, sharp-pointed.
- Fig. 65. A sound used in searching for the stone.
- Fig. 66. A grooved staff for the operation of lithotomy.
- Fig. 67. A cutting gorget.
- Fig. 68. A double gorget invented by Dr. Monro.
- Fig. 69. Extracting forceps.
- Fig. 70. A scoop.
- Fig. 71. A grooved staff for the operation of lithotomy as it is performed in females.
- Fig. 72. A tube containing a pair of elastic forceps for extracting stones from the urethra.
- Fig. 73. A jugum penis used in cases of incontinence of urine in men. See p. 343.
- Fig. 74. Pessaries for supporting the uterus in cases of prolapsus uteri in females; usually made of box-wood or cork.

- Fig. 75. A catheter for a male.
 Fig. 76. A catheter for a female.
 Fig. 77. Mr. Hunter's caustic conductor.
 Fig. 78. A bistoury used in the operation for phymosis.
 Fig. 79. A silver canula for conducting the urine after amputation of the penis.
 Fig. 80. A bistoury, with a probe of flexible silver joined to it, to be used in the operation of fistula in ano.
 Fig. 81. A bistoury, which has been lately used by some practitioners in the operation for the fistula in ano.
 Fig. 82. A wire of silver or lead, with a tube of the same metal, for laying open a fistula in ano.
 Fig. 83. A bandage for supporting the end of the rectum in cases of prolapsus ani.
 Fig. 84. Mr. Park's leather-case for supporting the fore-arm after luxations of the joints or fractures of the clavicle, or bones of the superior extremities. See p. 456.
 Fig. 85. Represents a fractured limb dressed with an eighteen-tailed bandage, and placed in the manner recommended by Mr. Pott.

PLATE IV.

- Fig. 86. Mr. Gooch's machine, improved by Dr. Aitken, for keeping a fractured thigh-bone properly extended. The upper circular bandage goes round the waist, the under one fixes immediately above the knee. See p. 470.
 Fig. 87. A bandage for a fractured patella.
 Fig. 88. A leather splint for a fractured leg.
 Fig. 89. Mr. James's machine, which is an improvement upon one invented some years ago by Mr. White of Manchester, for retaining fractured thighs, or bones of the leg, in their natural situation.
 Fig. 90. The common collar used in distortions of the spine.
 Fig. 91. Stays recommended by Mr. Jones for distortions of the spine. See p. 517.
 Fig. 92. An apparatus for a distortion of the leg.
 Fig. 93. An apparatus for a distorted leg, where the sole is turned much out of its natural direction.
 Fig. 94. Shoes which have been used with advantage in particular cases of club-feet.
 Fig. 95. An amputating knife.
 Fig. 96. A retractor of cloth or leather, used in amputating the larger extremities.
 Fig. 97. Iron retractors recommended by Dr. Monroe in amputation of the larger extremities.
 Fig. 98. The amputating saw now most generally used.

Fig. 99. Pincers for nipping off any points of bone which may remain after the saw has been used.

Fig. 100. A catline used in an amputation of the leg.

Fig. 101. An instrument invented by Mr. Moore, of London, for compressing the nerves, and thereby diminishing pain in performing various operations upon the extremities. See chap. xxxv.

Fig. 102. An apparatus invented by the late Dr. Monro for the cure of a rupture of the tendo Achillis.

Fig. 103. A pair of spring forceps, for laying hold of the extremities of arteries, &c.

PLATE V.

Mr. Ware's stillettes for the fistula lachrymalis.

Dr. Mudge's speculum ani.

Mr. Smith's air-pump vapour-bath.

New-invented hemispherical acoustic tubes for deaf persons.

Dr. Brown's fumigator for the teeth.

Mr. Sheldrake's instruments for the distorted spine.

Volta's *Galvanic Pile*, with an apparatus for medical purposes.

PLATE VI.

Dr. Dyce's improved tooth-instruments.

Mr. Reece's Odontagra.

Implements for the recovery of drowned persons.

PLATE VII.

M. Dessault's bistoire caché for lithotomy.

Mr. Watt's new instrument for the same.

Mr. Whately's bistoury for the fistula in ano,









Fig. 64.

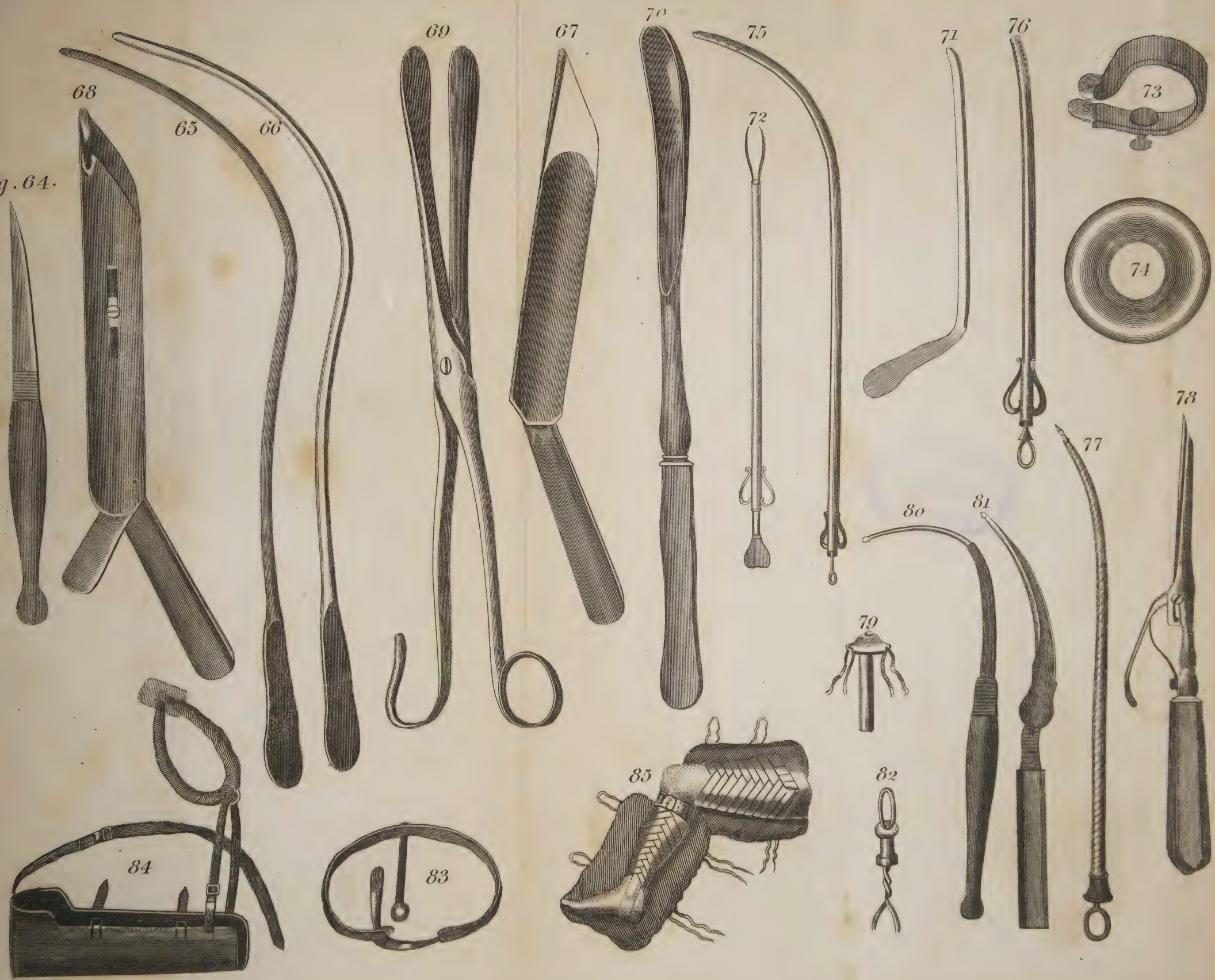




Fig. 86.







Fig. 4.

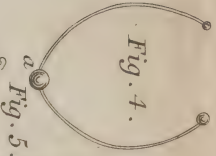


Fig. 5.

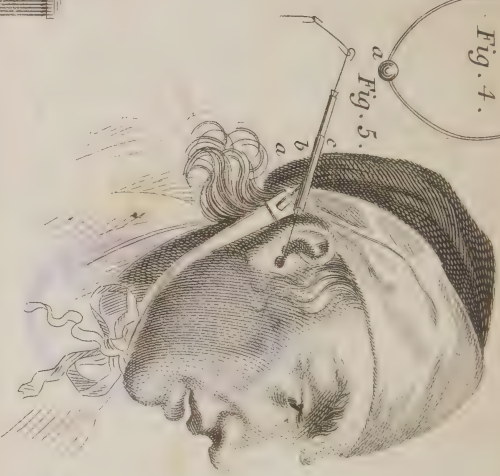


Fig. 6.

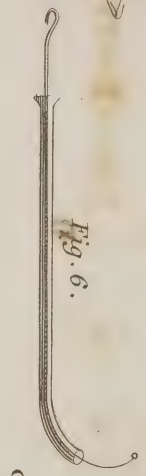


Fig. 1.

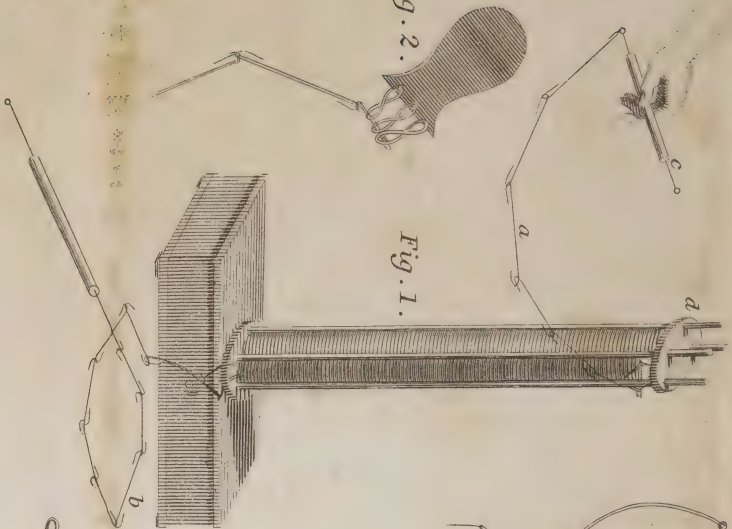
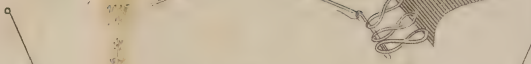


Fig. 2.



Mr. Sheldrake's Instruments for the Distorted Spine.

Fig. 1.

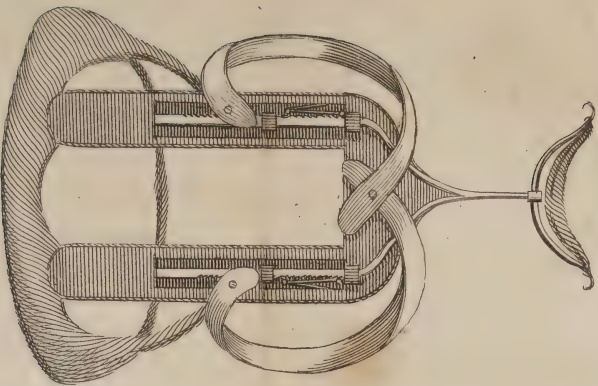
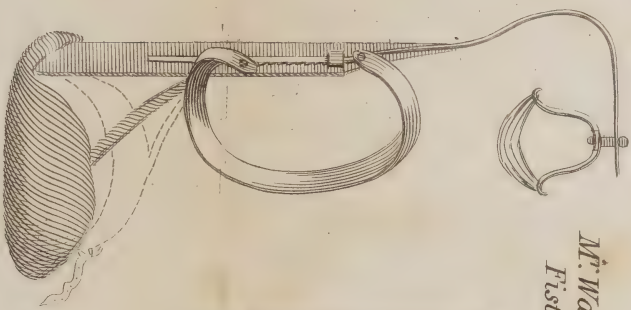
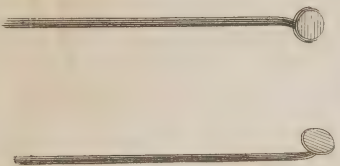


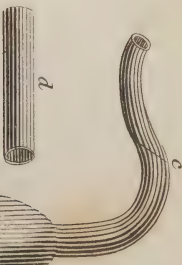
Fig. 2.



Mr. Ware's Silette for the
Fistula Lacrymalis.



D. Brown's Tunigator for the Teeth.



Hemispherical acoustic Tube.

Fig. 3.



Fig. 1.

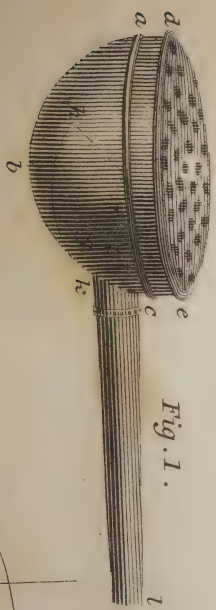
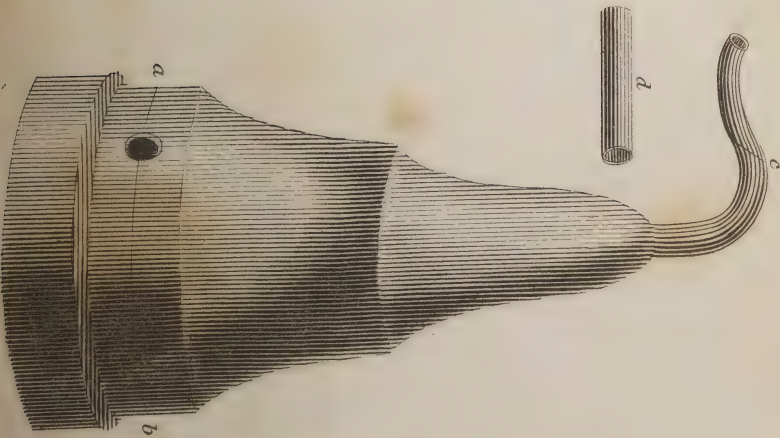
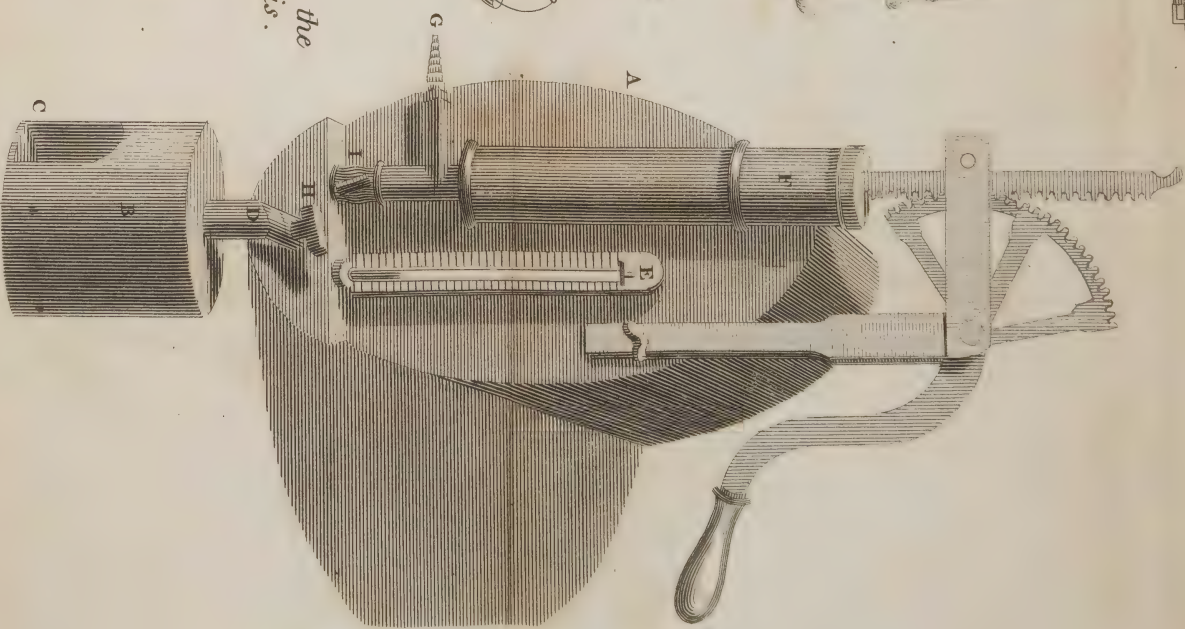
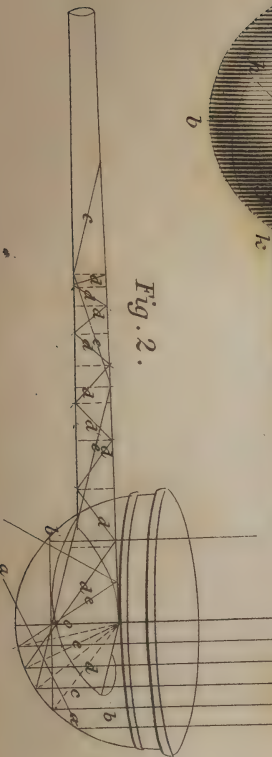
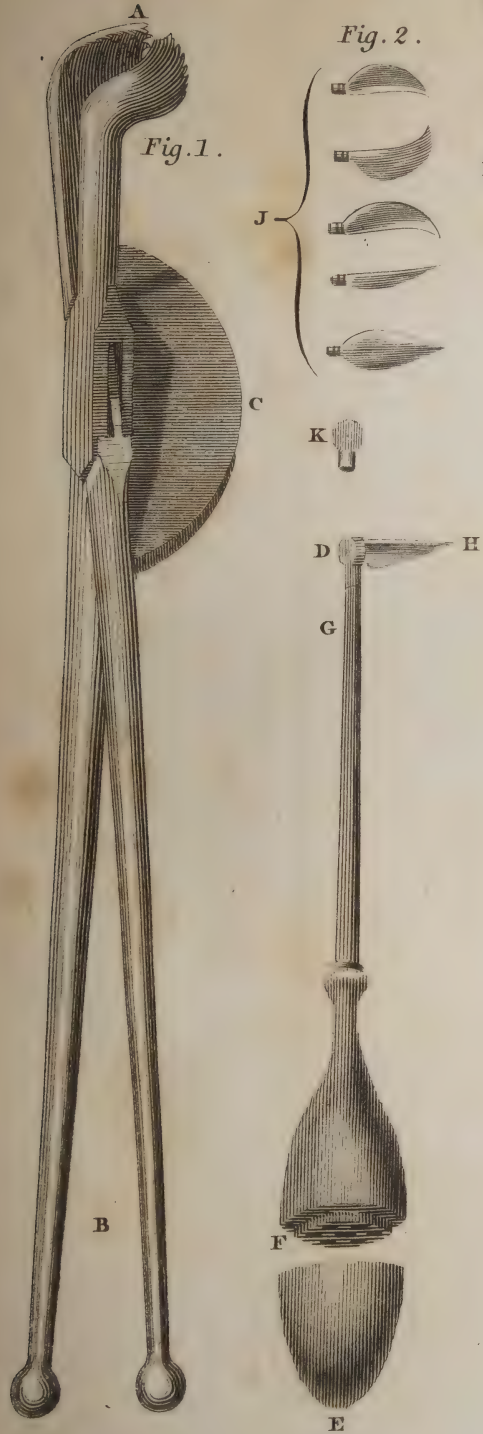


Fig. 2.

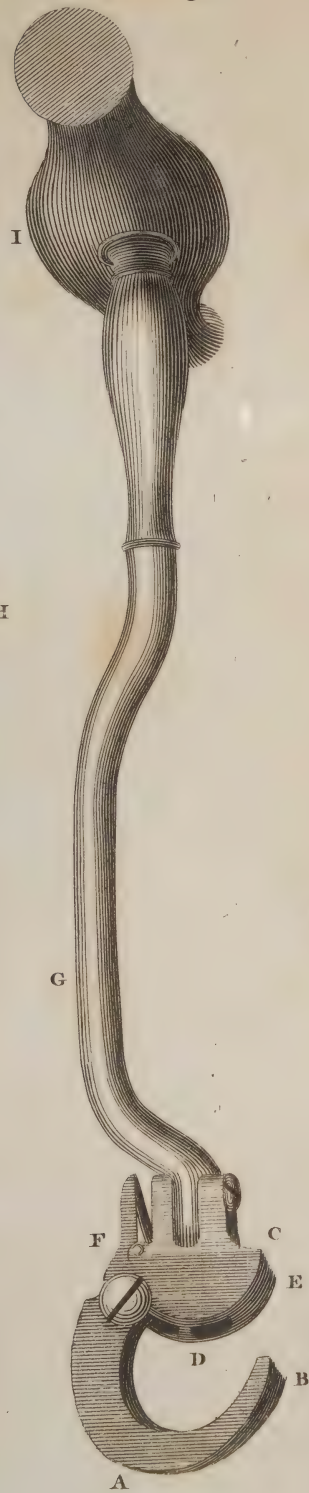




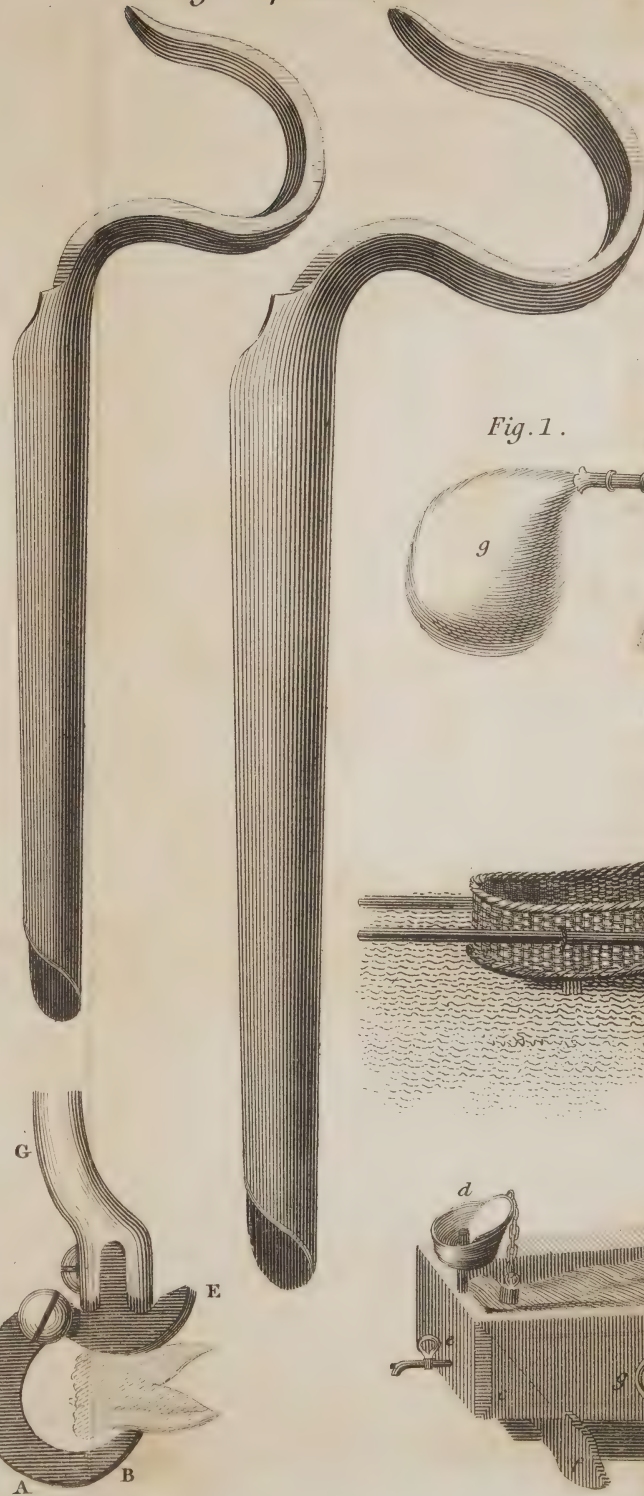
*D. Dyce's Improved
Tooth Instruments.*



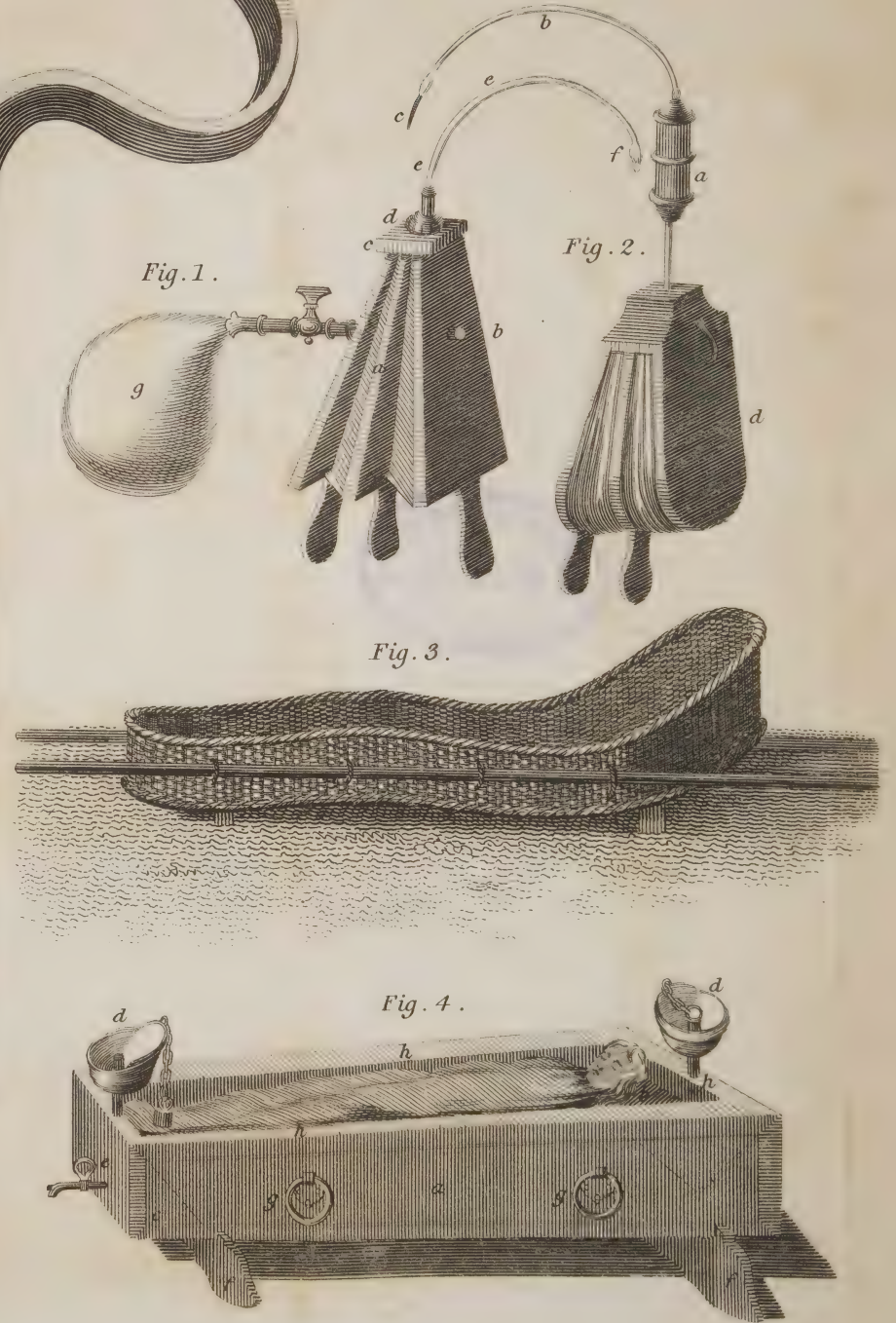
M. Reece's Odontagra.



Mudge's Speculum Ani.

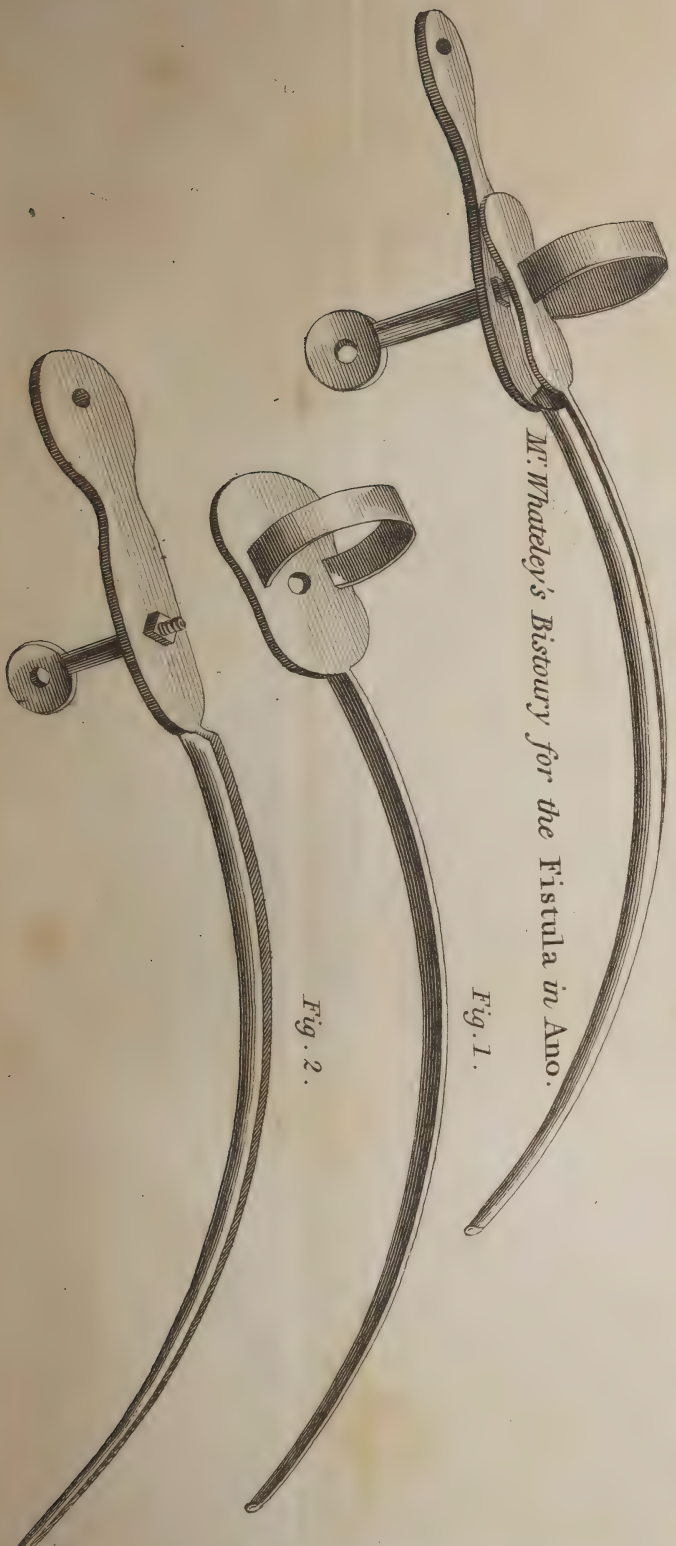
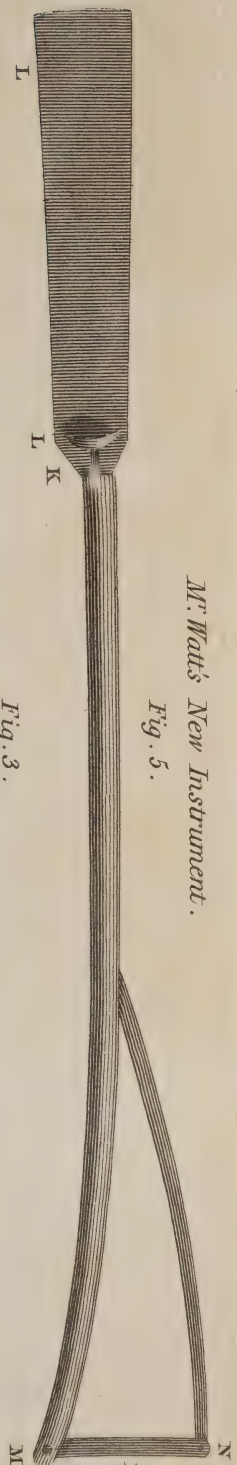
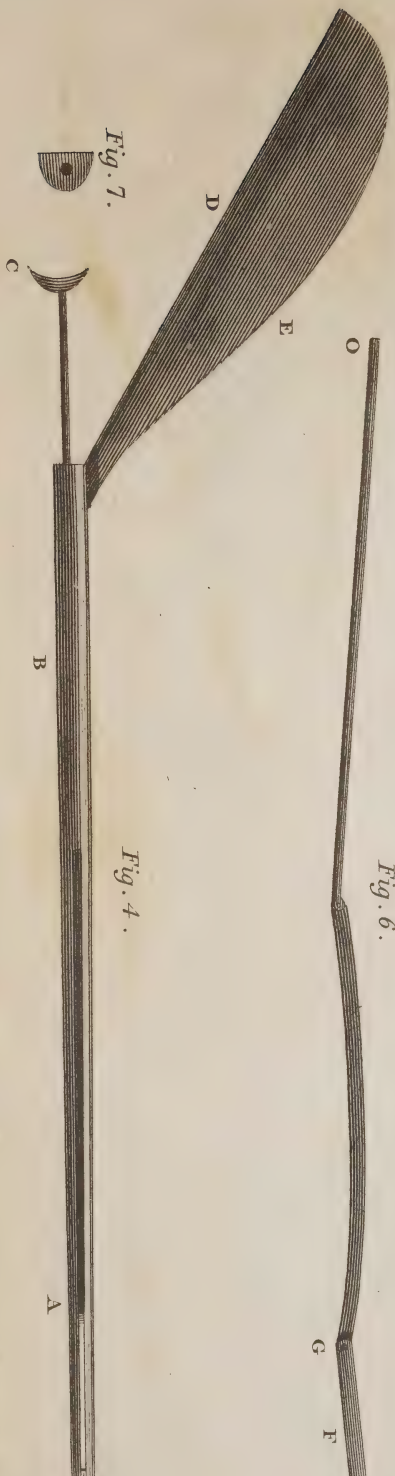
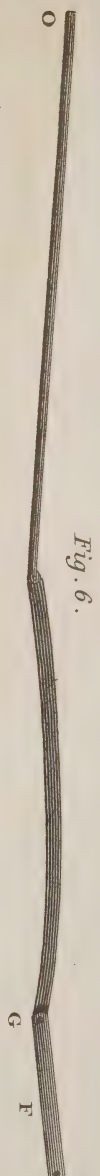
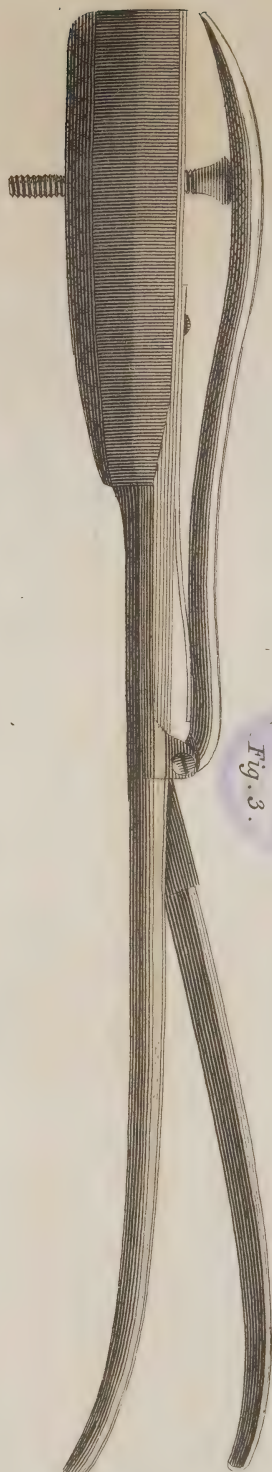
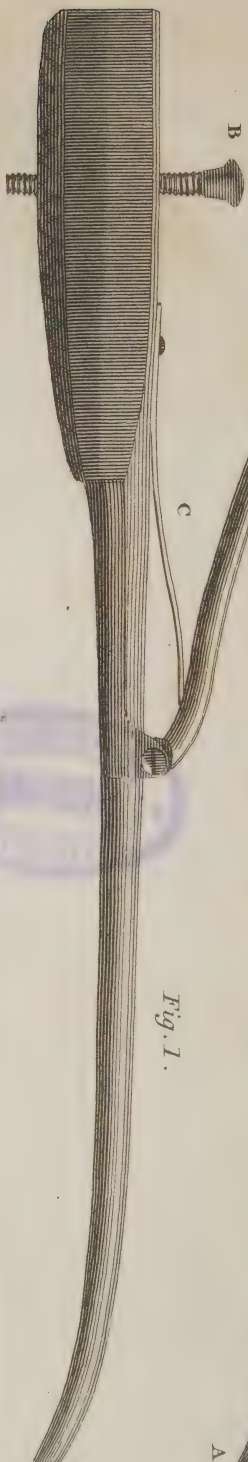
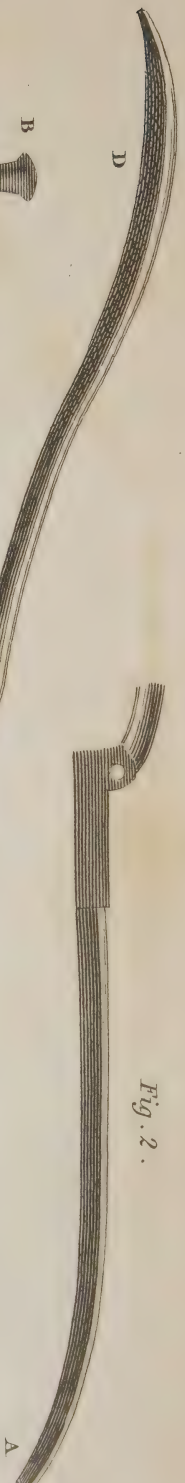


*Implements of Restoration
from Drowning.*





For Lithotomy M. Dejsault's Bistouri caché.





TABULA exhibens diversa ex HYDRARGYRO PRÆPARATA et
COMPOSITA, hæctenus cognita †.

I. HYDRARGYRUM SIMPLICITER PURIFICATUM.

- * Hydrargyrum purificatum.
- Angl. *Quicksilver, crude purified mercury.* Germ. *Reines
quecksilber.* Gal. *Mercuré pure.*
- Syn. Mercurius crudus purificatus officinarum.
- Argentum vivum purificatum.

II. PRÆPARATA IN QUIBUS HYDRARGYRUM SOLUMMODO DIVISUM
ESSE VIDETUR.

1. Decoctum Hydrargyri, i. e. Hydrargyrum simpliciter in aqua
coctum.
2. Extracto Glycyrrhizæ subactum.
3. Gummi aut mucilagine, e. g. Gummi Arabico, Traga-
canthæ, &c.
- * Hydrargyrum gummosum.
- Syn. Mercurius gummosus, inventore Plenck.

COMPOSITA.

- * α Pilulæ ex hydrargyro gummoso.
- Syn. Pilulæ ex mercurio gummoso. *Plenck. Pharm. Chir.*
- β Solutio mercurialis gummosa. *Ibid.*
- Syn. Mixtura mercurialis. *G.*
- γ Potio mercurialis. *B.*
- δ Lac mercuriale. *Plenck.*
- 4. Resina aut Balsamo; e. g. Terebinthina, Balsamo Copai-
væ, &c.
- * Hydrargyrum terebinthinatum, &c.

† Literæ, quibus præparata et composita notantur, significant: O. Offi-
cinarum; L. Pharmacopœia Londinenfis; S. Pharm. Suecica; D. Pharm.
Danica; E. Pharm. Edinburgensis; B. Dispensatorium novum Brunswicense;
E. paup. Pharm. Edinburgensis Pauperum; T. Pharm. Nosocomii Sti. Tho-
mæ Londinenfis; G. Pharm. Nosocomii Sti. Georgii Lond. * Lewis Disp.

COMPOSITA.

* *Pilulæ ex hydrargyro terebinthinato.*

Pilulæ mercuriales. L.

Pilulæ mercuriales laxantes. G.

Pilulæ mercuriales sialagogæ. D.

Injectio mercurialis. E. Paup.

5. *Pinguedine animali aut oleis unguinosis; e. g. Axungia porcina, anserina; butyro Cacao.*

* *Hydrargyrum unguinosum.*

* *Unguentum hydrargyri.*

Syn. Unguentum ex hydrargyro cœruleum. E.

Unguentum mercuriale, seu unguentum Neapolitanum.

COMPOSITA.

a Unguentum hydrargyri. L.

Unguentum hydrargyri mitius. L.

Unguentum mercuriale. D.

β Ceratum mercuriale. L.

γ Emplastrum mercuriale. O.

Emplastrum ex hydrargyro. E.

Emplastrum ammoniaci cum hydrargyro. L.

Emplastrum lithargyri cum hydrargyro. L.

Emplastrum de ranis cum mercurio.

6. *Terra Calcareæ; e. g. Creta, Lapidibus aut Chelis Cancro-
rum, &c.*

Mercurius alkalifatus. E.

Pulvis mercurialis. G.

III. PRÆPARATA IN QUIBUS HYDRARGYRUM, MEDIANTE IGNE ET LIBERO AERIS ACCESSU, IN CALCEM VERTITUR.

* *Hydrargyrum calcinatum.*

Syn. Mercurius calcinatus. L. S.

Mercurius præcipitatus per se. L.

COMPOSITA.

* *Pilulæ ex hydrargyro calcinato.*

Pilulæ syphiliticæ. T.

Pilulæ ex mercurio calcinato. G.

Pilulæ ex mercurio calcinato anodynæ. G.

IV. PRÆPARATA IN QUIBUS HYDRARGYRUM PARTIM DIVISUM,
PARTIM SOLUTUM ESSE, VIDETUR.

1. Saccharo, Manna, Conserva Rosarum, Cynosbati, &c.

- * Saccharum hydrargyratum.

COMPOSITA.

- * Trochisci ex hydrargyro saccharato.

Bolus cœruleus. *T.*

Bolus mercurialis. *G.*

Syrupus Hydrargyri. *S. Phar. Chir.*

- * Mel hydrargyratum.

COMPOSITA.

Pilulæ Æthiopicae. *E.*

Pilulæ mercuriales purgantes. *E. paup.*

Pilulæ Bellosti.

3. Sulphure purificato.

- * Hydrargyrum fulphuratum.

a Trituratione aut fusione.

- * Hydrargyrum fulphuratum nigrum.

Æthiops mineralis. *O.*

COMPOSITA.

Pulvis Æthiopicus. *G.*

b Sublimatione.

- * Hydrargyrum fulphuratum rubrum.

Cinnabaris factitia, seu artificialis. *O.*

COMPOSITA.

Pulvis antilyssus Sinensis. *O.*

c Præcipitatione.

4. Sulphure Antimonii.

a Trituratione.

- * Sulphur antimonii hydrargyratum.

Æthiops antimonialis. *O.*

COMPOSITA.

Pilulæ Æthiopicae. *E. D.*

b Sublimatione.

Sulphur antimonii hydrargyratum rubrum.

Syn. Cinnabaris antimonii. *O.*

COMPOSITA.

Bolus Cinnabarinus. *G.*

V. PRÆPARATA IN QUIBUS HYDRARGYRUM MEDIANTE ACIDO IN FORMAM SALIS AUT CALCIS MUTATUM EST.

1. Acido Sebi. 2. Acido Muriatico. 3. Acido Sacchari. 4. Acido Succini. 5. Acido Arsenici. 6. Acido Acetofellæ. 7. Acido Phosphori. 8. Acido Vitrioli. 9. Acido Sacchari Lactis. 10. Acido Tartari. 11. Acido Citri. 12. Acido Nitri. 13. Acido Fluoris mineralis. 14. Acido Aceti. 15. Acido Boracis. 16. Acido Cœrulei Berolinensis. 17. Acido Molybdænæ. 18. Acido Tungstenico. 19. Acido aëreo. 20. Acido phosphorico.

I. *Hydrargyrum cum acido sebi combinatum.*

Hydrargyrum sebinum.

- * *Præp. Unguentum hydrargyri.*

II. *Cum acido muriatico.*

- * *Hydrargyrum muriatum.*

- * *Hydrargyrum muriatum fortius.*

A. *Sublimatione.*

- * *Hydrargyrum muriatum fortius sublimatum.*

Syn. Mercurius sublimatus corrosivus.

Mercurius sublimatus albus. O.

Mercurius cum sale ammoniaco sublimatus.

B. *Præcipitatione.*

Ex acido nitri, mediante acido muriatico dephlogificato, inventore Bertholet.

Hydrargyrum muriatum fortius præcipitatum.

COMPOSITA.

α *Solutio sublimati spirituosæ (Van Swieten).*

Syn. Solutio mercurii sublimati corrosivi. E.

Mixtura mercurialis. S.

Mercurius sublimatus solutus. G.

β * *Solutio hydrargyri muriati fortioris aquosa.*

Pilulæ e mercurio corrosivo albo. S.

Dr. Ward's white drop.

Syrop du Cuifinier.

γ * *Lotio syphilitica flava, s. lotio ex hydrargyro muriato fortiori*

Syn. Aqua phagedænica. O.

Liquor mercurialis. A.

Lotio mercurialis. T.

δ *Solutio sublimati balsamica. Plenck.*

ε * *Liquor ad condylomata.*

Syn. Aqua caustica pro condylomatibus. Plenck.

- * *Hydrargyrum muriatum mitius*; i. e. acidum muriaticum hydrargyro superfaturatum.

A. Sublimatione.

Syn. Mercurius dulcis (sublimatione paratus). O.

Mercurius dulcis sublimatus. E.

Calomel seu calomelas. L.

Aquila alba.

Panacea mercurialis.

Mercurius dulcis lunaris. Schroeder.

B. Præcipitatione.

Ex acido nitroso, mediante sale communi, inventore Schæle.

- * *Hydrargyrum muriatum mitius præcipitatum.*

Mercurius præcipitatus dulcis.

Calx hydrargyri muriata præcipitata.

- a Ex acido muriatico, mediante alkali vegetabili.

Calx hydrargyri alba. L.

- b Ex acido muriatico mediante alkali minerali.

Mercurius præcipitatus albus. A.

- c Ex acido muriatico mediante alkali volatili.

Mercurius præcipitatus albus. E.

- d Ex acido muriatico mediante cupro.

Mercurius præcipitatus viridis. E.

COMPOSITA.

Bolus mercurialis. E.

Bolus jalappæ cum mercurio. B.

Bolus rhei cum mercurio. Ib.

Pilulæ calomelanos. G.

Pilulæ Plummeri. E.

Pilulæ alterantes Plummeri. O.

Pilula depurans. T.

Pulvis Plummeri. O.

Pilulæ mercuriales purgantes. A.

Pilulæ catarrhales purgantes. D.

Pilulæ laxantes cum mercurio. Ib.

Pulvis e scammonio cum mercurio. T.

- * Lotio syphilitica nigra, lotio ex hydrargyro muriato mitiori.

Syn. Lotio mercurialis. G.

Unguentum e mercurio præcipitato. L.

Linimentum mercuriale. E. Paup.

III. Cum acido sacchari.

- a Hydrargyrum saccharatum. Bergman.

- * b Saccharum hydrargyratum, seu

Hydrargyrum saccharo cando subactum.

IV. *Cum acido succini.*Hydrargyrum succinatum. *Bergman.*V. *Cum acido arsenici.*Hydrargyrum arsenicatum. *Bergman.*VI. *Cum acido oxalis acetosellæ.*Hydrargyrum oxalinum. *Bergman.*VII. *Cum acido phosphorico.*Hydrargyrum phosphoratum. *Bergman.*

Præcipitatione ex acido nitroso mediante urina recenti.

Rosa mineralis. *O.*VIII. *Cum acido vitriolico.*

* a Hydrargyrum vitriolatum.

Vitriolum mercurii. *O.*Oleum mercurii. *O.*

b Hydrargyrum vitriolatum flavum.

Turpethum minerale. *O.*Hydrargyrum vitriolatum. *L.*Mercurius flavus. *E.*Mercurius præcipitatus luteus. *D.*Turpethum nigrum. *O.*

c Hydrargyrum præcipitatum ex acido nitroso mediante hepate sulphuris aut calcis.

Mercurius præcipitatus niger. *O.*IX. *Cum acido sacchari lactis.*X. *Cum acido tartari.*a Hydrargyrum tartarifatam. *Bergman.** b Tartarus hydrargyratus; i. e. hydrargyratum cum tartaro purificato unitum. *Terre feuilletée mercurielle, inventore Pressavin.*

c Præcipitatione ex acido nitroso mediante acido tartari.

* Hydrargyrum tartarifatam flavum; vulgo, *Pulvis Constantinus.*

d Præcipitatione ex acido muriatico et acido tartari junctis mediante alkali vegetabili.

* Hydrargyrum tartarifatam album; vulgo, *Pulvis argenteus.*XI. *Cum acido citri.*Hydrargyrum citratum. *Bergman.*XII. *Cum acido nitroso.*

* Hydrargyrum nitratum.

- a Calcinatum mediante igne.
- * Hydrargyrum nitratum rubrum.
 - Mercurius corrosivus ruber. *L. E.*
 - Mercurius præcipitatus ruber.
 - Pulvis principis. *O.*
 - Mercurius corallinus. *L.*
 - Mercurius tricolor. *O.*
 - Panacea mercurii. *O.*
 - Arcanum corallinum.
 - Panacea mercurii rubra. *O.*

COMPOSITA.

- Balsamius mercurialis. *Plenck.*
- Unguentum ophthalmicum. *St. Ives.*
- Balsamum ophthalmicum rubrum. *D.*
- Unguentum præcipitatum. *G.*
- Unguentum ad lippitudinem. *T.*
- Unguentum mercuriale rubrum. *D.*
- Unguentum pomatum rubrum. *D.*
- * b Acidum nitri hydrargyratum ; i. e. hydrargyrum in acido nitroso solutum.
 - Solutio mercurii. *E.*

COMPOSITA.

- Unguentum citrinum. *E. S.*
- * c Præcipitatione.
 - Ex acido nitri mediante alkali volatili.
 - * Hydrargyrum nitratum cinereum.
 - Pulvis mercurii cinereus. *E.*
 - Turpethum album. *O.*
 - § Ex acido nitroso mediante alkali volatili vinoso (spiritu falis ammoniaci vinoso).
 - Turpethum nigrum.
 - Mercurius præcipitatus niger.
 - γ Ex acido nitroso mediante alkali vegetabili.
 - Mercurius præcipitatus fuscus, inventore *Wurtz.*
 - δ Ex acido nitroso mediante cupro.
 - Mercurius præcipitatus viridis. *B.*

XIII. *Cum acido fluoris mineralis.*

Hydrargyrum fluoratum. *Bergman.*

XIV. *Cum acido aceti.*

* Hydrargyrum acetatum. *Bergman.*

COMPOSITA.

Trochisci, *S. pilulæ Keyseri.*

XV. *Cum acido boracis.*

Hydrargyrum boraxatum. *Bergman.*

XVI. *Cum acido cœrulei Berolinensis.*

XVII. *Cum acido molybdæne.*

XVIII. *Cum acido tung stenico.*

XIX. *Cum acido aëreo.*

Hydrargyrum aëratum. *Bergman.*

XX. *Cum acido phosphorico.*

END OF THE FOURTH VOLUME.

T. Davison,
White-Friars.

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